Management Plan for Conservation Lands and the Adjacent Campus Buildout Lands for the University of California, Merced

Prepared for:

University of California Merced
Physical Planning, Design and Construction
P.O. Box 2039
Merced, CA 95344
Contact: Brad Samuelson

Prepared by:

Daniel A. Airola
Airola Environmental Consulting
2700 6th Avenue
Sacramento, CA 95818
916/454-3073

With assistance from:

ICF/Jones & Stokes
and
LSA Associates

September 2008

Airola, D. A. 2008. *Management Plan for Conservation Lands and Adjacent Campus Buildout Lands for the University of California, Merced*. September. Sacramento, CA. Prepared for University of California, Merced, Physical Planning, Design and Construction, Merced, CA.

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Acronyms

AUMs	animal-unit-months
BA	Biological Assessment
Cal Fire	California Department of Forestry and Fire Protection
CLR	Campus Land Reserve
CNR	Campus Natural Reserve
CRHR	California Register of Historic Resources
CRT	California Rangeland Trust
CWA	Clean Water Act
EIR	environmental impact report
EIS	environmental impact statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
IPM	Integrated Pest Management
LRDP	Long Range Development Plan
NRS	Natural Reserve System
RDM	residual dry matter
RMP	Resource Mitigation Plan
SNRI	Sierra Nevada Research Institute
TNC	The Nature Conservancy
UCLC	University of California Land Company
USACE	U.S. Army Corps of Engineers
VST Preserve	Virginia Smith Trust Preserve property

Chapter 1
Introduction

This Management Plan (Plan) describes the management policy and actions for lands owned and protected by the University of California (UC), and other mitigation lands that have contributed to the establishment of the UC Merced (UCM) Campus. These lands comprise the following categories.

- **UCM Conservation Lands (Tier 1a Lands).** Lands owned by UC and committed for long-term management by UCM for conservation purposes under conservation easements; these lands comprise the Virginia Smith Trust (VST) Preserve and Campus Natural Reserve (CNR). This plan also includes the Myers Easterly property as part of the UCM Conservation Lands. This area is owned jointly by the UC and VST, and will be managed by UCM as a Tier 1a mitigation area.
- **CST Conservation Lands (Tier 1b Lands).** The Cyril Smith Trust (CST) lands that are currently owned by The Nature Conservancy (TNC) and would be protected by a conservation easement.
- **Tier 2 Conservation Lands.** Five properties not owned in fee title by UC or conservation entities, but for which conservations easements have been acquired.
- **Adjacent Campus Buildout Lands.** UC lands designated for future use as the UCM Campus that are located adjacent to the UCM Conservation Lands.

This Plan is intended to meet various project requirements, including development of an Adaptive Management Plan, set forth in the Biological Opinion (BO) issued for the project (U. S. Fish and Wildlife Service 2002) and the conservation easement for the VST Preserve lands. The plan will serve for an extended period, assumed at approximately 20 years, although it incorporates adaptive changes and periodic reviews to adjust management.

The Plan does not address interim management of lands previously designated as the University Community, including those recently proposed for addition to the campus. Similarly, the Plan does not address management of lands to be acquired for wetland restoration and creation, which will be addressed in the forthcoming *Final Compensatory Wetland Mitigation and Monitoring Plan*.

The Plan recognizes that management needs for different lands vary depending on resource values, regulatory requirements, location, ownership, and proposed uses. UCM Conservation Lands and Adjacent Campus Buildout Lands are

addressed together in this Plan because their ownership by UCM allows greater management flexibility and application of adaptive management.

Reliance on a conservation easement to protect CST Conservation Lands will limit management options for this property. Because the proposed easement has not yet been developed, the specific terms of the easement are not known. General discussion with TNC and the agencies regarding easement provisions and examination of easement documents for Tier 2 Conservation Lands have provided a basis for initial description of the likely easement conditions and resulting management program. This component of the Plan will likely require revision once the specific provisions of the CST easement are determined.

Management of the Tier 2 Conservation Lands is defined by terms of the conservation easements. Management provisions for these lands have been included in this Plan as Appendix A.

The Plan addresses policies regarding various land uses and management commitments to protect and maintain conservation values consistent with regulatory commitments and requirements for the UCM project. The Plan is anticipated to guide all future management, but is also designed to respond adaptively to changing conditions associated with campus development, regulatory requirements, and the results of monitoring.

Background on the project and its compliance history and requirements is available in the *Proposed Conservation Strategy for the UC Merced Project* (ICF Jones & Stokes 2008) (Conservation Strategy). Importantly, the BO for the project, issued in 2002 by the U.S. Fish and Wildlife Service (USFWS), identified a set of required parameters, which included preparation of the Conservation Strategy. One element of the strategy was the preparation of a management plan for mitigation lands.

Parameter 1 of the BO requires that:

> The Applicants will prepare and implement, in coordination with USFWS and the California Department of Fish and Game (DFG), a comprehensive strategy for the conservation of the San Joaquin kit fox, vernal pool branchiopods and plants and other protected species to guide the development and implementation of specific conservation for the Proposed Actions…

Parameter 1 also specifies that:

> The Conservation Strategy will include monitoring and adaptive management measures and be consistent with and intended to implement the Recovery Plan for Upland Species of the San Joaquin Valley, and any future federal recovery planning effort.

The Conservation Strategy, to which this Plan contributes, identifies 13 target species for conservation. Of these species, the nine species listed below are known to occur on conservation lands and are the focus of management attention.

- Succulent owl's-clover (*Castilleja campestris* ssp. *succulenta*).
- Colusa grass (*Neostapfia colusana*).
- San Joaquin Valley orcutt grass (*Orcuttia inaequalis*).
- Conservancy fairy shrimp (*Branchinecta conservatio*).
- Vernal pool fairy shrimp (*Branchinecta lynchi*).
- Midvalley fairy shrimp (*Branchinecta mesovallensis*).
- Vernal pool tadpole shrimp (*Lepidurus packardi*).
- California tiger salamander (*Ambystoma californiense*).
- San Joaquin kit fox (*Vulpes macrotis mutica*) (suitable habitat only).

Chapter 2
Plan Area Description

The UC Merced mitigation lands addressed in this Plan are located in eastern Merced County in an area recognized for its high-value vernal pool and associated wetland and grassland habitats.

The Tier 1 Conservation Lands addressed in the main portion of this Plan are adjacent to the north and east sides of the proposed UCM Campus (Figure 2-1). The area is also bordered by cultivated agricultural lands and grasslands used for livestock grazing. Elevations range from approximately 200 to 570 feet (75 to 140 meters). Topography is flat to moderately rolling. These lands are within the watersheds of Fahrens, Cottonwood, and Black Rascal Creeks, which flow generally southwest from the property to Bear Creek and the San Joaquin River.

Tier 1b and Tier 2 Conservation Lands—the CST lands and five other easement properties, respectively —are described in this chapter; management direction for CST Conservation Lands is discussed in Chapter 6, *Management Direction for CST Conservation Lands*, and the management requirements in easement agreements for Tier 2 Conservation Lands are summarized in Appendix A.

2.1 Management Units

The Plan Area consists of several categories of Conservation Lands, as well as Adjacent Campus Buildout Lands. As noted in Chapter 1, the Plan does not address lands south of the former campus boundary (including those that may be added into the campus), because interim management is expected to be a continuation of existing uses, and the lands are not closely connected to the UCM conservation lands.

The land classification scheme described below is refined from that described in previous documents. The Plan addresses four major land categories.

- **UCM Conservation Lands (Tier 1a).** Lands owned wholly or in part by the UC Regents (UC), and managed by UCM for conservation purposes with granted conservation easements.
- **CST Conservation Lands (Tier 1b).** Land currently owned in fee title by TNC, to be protected with a comprehensive conservation easement.

- **Tier 2 Conservation Lands.** Five other private mitigation ownerships under protective easements.
- **Adjacent Campus Buildout Lands (Non-Conservation Lands).** Lands owned by UC and planned for future campus development, but requiring specialized management during the interim period, because they are adjacent to conservation lands.

The following sections summarize the location, size, ownership, and management of all mitigation lands addressed in the Plan.

2.1.1 UCM Conservation Lands (Tier 1a)

Two Tier 1a mitigation land units addressed in the Plan have been committed to conservation uses as mitigation for proposed construction of the UCM Project: the VST Preserve and the CNR. These are collectively referred to as *UCM Conservation Lands.*

2.1.1.1 Virginia Smith Trust Preserve

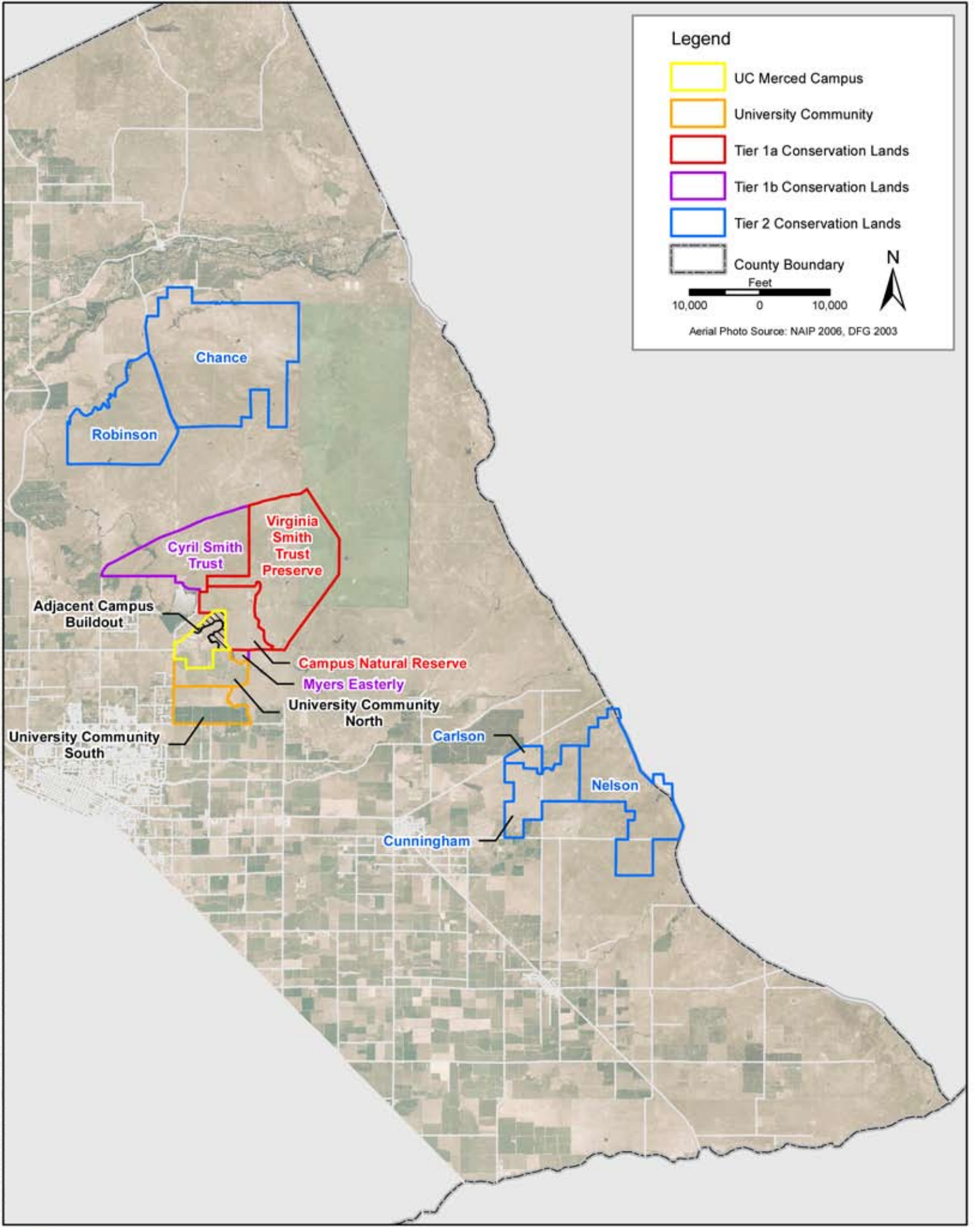
The 5,030-acre VST Preserve consists of the lands provided to UC by the VST, with the exception of those portions of the property that have been dedicated to the campus and the CNR. This property has been referred to as the *VST Remainder property* in previous documents (e.g., in the Biological Assessment [BA] and the BO). The VST Preserve is owned by UC and managed by UCM. The conservation easement on the property is owned by TNC.

2.1.1.2 Campus Natural Reserve

The CNR (a portion of the original VST property) was originally designated to encompass the watershed of the playa lake occupied by Conservancy fairy shrimp (*Branchinecta conservatio*). The 2007 campus reconfiguration expanded the CNR from 750 acres to 1,307 acres by incorporating the previously designated 340-acre Campus Land Reserve (CLR) and 221 acres of the originally proposed campus. New areas of the CNR will be protected under a conservation easement that is expected to be similar to that governing management of the VST lands.

2.1.1.3 Myers Easterly Property

The 91-acre Myers Easterly property is owned by the University of California Land Company (UCLC) LLC, an entity jointly owned by UC and the VST. The property was originally proposed as a mitigation area for vernal pool habitat impacts, but was determined to be unsuitable for this use. The UCLC has agreed



ICF Jones & Stokes

Figure 2-1
Conservation Lands for the UC Merced Project

that the land shall be treated as a Tier 1 mitigation area, and will be managed by UCM's SNRI Land Manager.

2.1.2 Adjacent Campus Buildout Lands

The Adjacent Campus Buildout Lands consist of the portion of the proposed campus footprint outside the boundaries of the existing Phase I campus that are adjacent to conservation lands and north of the extension of Bellevue Road. Originally, a proposed 910-acre campus footprint (including Phase 1 lands) was evaluated in the project environmental impact report (EIR) (UC Merced 2002) and analyzed in the BA (EIP Associates 2002; Jones & Stokes 2002a) and BO (U.S. Fish and Wildlife Service 2002). The portion of the campus footprint north of Bellevue Road was reduced by UCM to 579 acres in 2007 following extensive discussions with regulatory agencies and interested stakeholders.

To meet the area requirements of the campus, an additional 221-acre area that was previously allocated to the University Community has been added to the proposed campus (Figure 2-2).

The Adjacent Campus Buildout Lands will be developed over several decades. This phased development necessitates management of these lands during the interim period prior to their development. The lands slated for campus development are not physically separated (i.e., fenced) from the CNR, therefore, this Plan addresses the interim management of Adjacent Campus Buildout Lands as well as UCM Conservation Lands.

Adjacent Campus Buildout Lands are committed to campus development. Therefore, they provide an opportunity to test measures to reduce impacts of campus development, evaluate alternative management practices for UCM Conservation Lands, and support temporary educational and recreational activities, all with limited risk of long-term effects.

2.1.3 CST Conservation Lands (Tier 1b)

The CST property is a 3,070-acre parcel located adjacent to the VST and CNR lands that was purchased in fee title with a Wildlife Conservation Board grant. The land is currently owned in fee title and managed for grazing and habitat protection by TNC.

2.1.4 Tier 2 Conservation Lands

The five Tier 2 properties encompassing 17,141 acres were selected as mitigation lands because of their high-value biological resources (Vollmar 2002; ICF Jones & Stokes 2008). Protections for these lands are limited to the requirements in the

conveyed easements and therefore, management discretion is substantially less detailed and flexible than for UCM Conservation Lands. Management of these lands is addressed separately in Appendix A.

2.2 Ownership and Management Responsibilities

Current and expected future ownership and management responsibilities differ among the different mitigation properties.

2.2.1 UCM Conservation and Adjacent Campus Buildout Lands

UCM owns the VST Preserve, CNR, and Adjacent Campus Buildout Lands in fee title. The Myers Easterly is owned by the UCLC, an LLC owned jointly by UC and the VST. Conservation easements to the VST Preserve and Myers Easterly are held by TNC. UCM proposes to convey a conservation easement on the CNR to a conservation entity.

Currently, UCM Conservation and Adjacent Campus Buildout Lands are managed by the UCM Facilities Department and the Campus Director of Environmental Affairs. In the future, the Sierra Nevada Research Institute (SNRI), in cooperation with the Campus Director of Environmental Affairs and Facilities Department, will have management responsibility over the VST Preserve, CNR, Myers Easterly, and (prior to development) Adjacent Campus Buildout Lands.

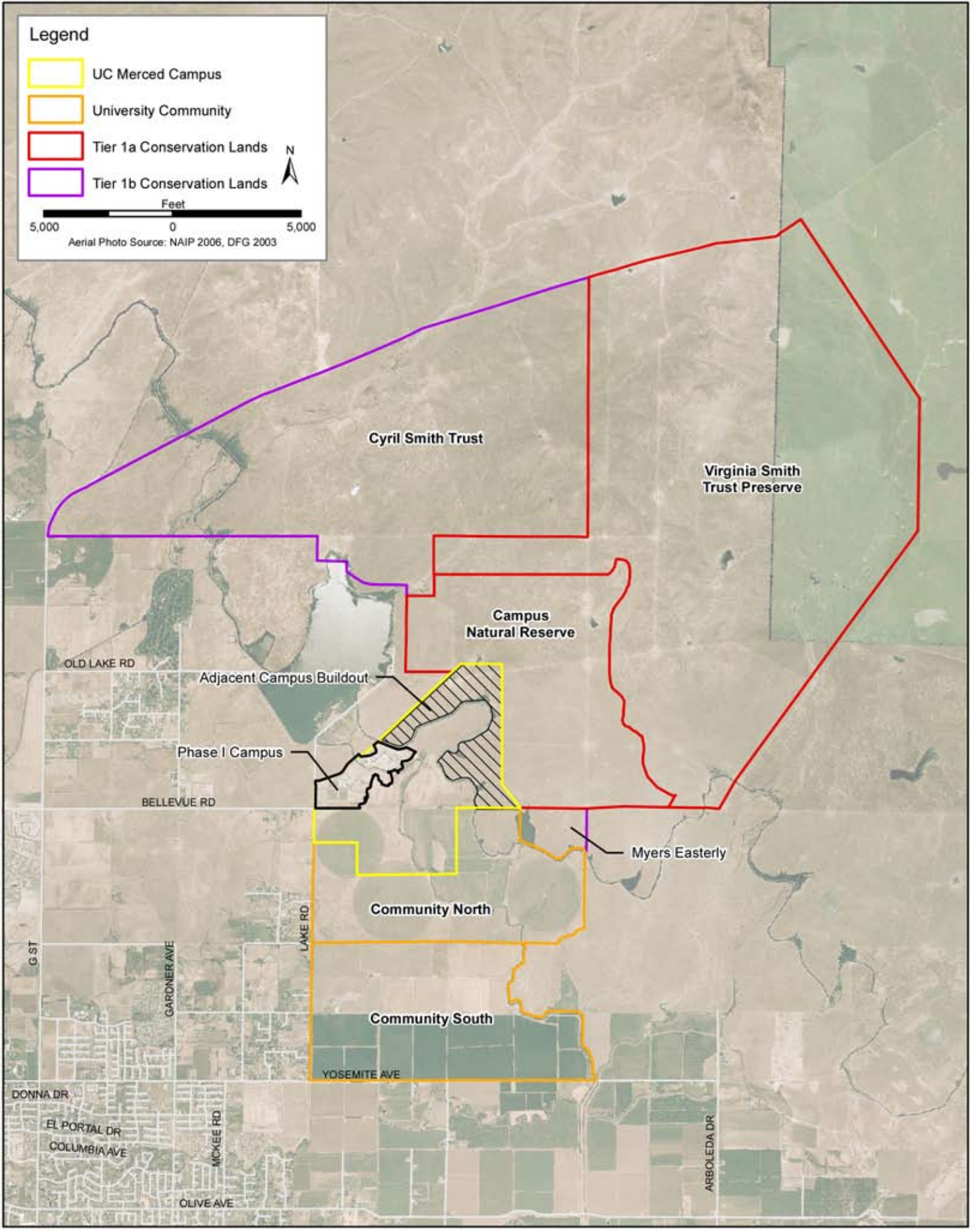
Formal designation of a portion of the UCM Conservation lands to the University of California Natural Reserve System (NRS) has been contemplated, but no proposal will be submitted until completion of the environmental permitting and planning process is completed.

All land management and protection requirements for mitigation purposes, as outlined in this Plan and in permit and compliance documents, would remain in place if any transfer to NRS status occurs. If such a transfer does occur, it is anticipated that SNRI will retain management responsibility.

2.2.2 CST Conservation Lands

No conservation easement currently exists on these lands. The WCB grant agreement that purchased the land provides for the permanent protection of the property's habitat values.

TNC, with permitting agency support, has proposed to protect the CST Conservation Lands through establishment of a conservation easement. The



ICF Jones & Stokes

Figure 2-2
Tier 1 Conservation Lands, Campus Buildout, and University Community

easement would provide USFWS and DFG with access to the property to conduct compliance monitoring (see Appendix A).

2.2.3 Tier 2 Conservation Lands

Management of Tier 2 Conservation Lands is under the direct control of the existing landowners. Conservation easements are held by TNC and the California Rangeland Trust (CRT). Easement requirements (Appendix F) must be legally met by landowners. As the easement holders, TNC and CRT are responsible for monitoring and ensuring that the terms of the easement are met.

2.3 Relationship of Plan Lands to Regional Landscape and Community

The UCM, CST, and Tier 2 Conservation Lands are recognized as important components of the proposed regional conservation efforts for eastern Merced County, as set forth in the Conservation Strategy (ICF Jones & Stokes 2008) and in keeping with the *Recovery Plan for Upland Species in the San Joaquin Valley* (U.S. Fish and Wildlife Service 1998) and the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (U.S. Fish and Wildlife Service 2005).

UCM Conservation Lands acquired in fee title by UC and UCLC and managed by UC for conservation purposes (VST, CNR, and Myers Easterly) comprise 6,430 acres. The CST lands currently owned by TNC comprise an additional 3,070 acres (ICF Jones & Stokes 2008). Existing acquired easements protect an additional 17,141 acres of the Plan Area. In total, the project's current mitigation lands constitute more than 13% of the roughly 200,000 acres of priority conservation lands in eastern Merced County (ICF Jones & Stokes 2008). Additional land are expected to be acquired and protected in wetland restoration and creation areas (Gibson and Skordal 2008).

These lands also play an important role as grazing lands in the agricultural economy of Merced County. Conservation and grazing uses are considered highly compatible in this area.

Contributions of UCM mitigation lands to the regional conservation of San Joaquin kit fox, as described in the Conservation Strategy (ICF Jones & Stokes 2008), are listed below.

- Protection of lands within the designated kit fox dispersal corridor.
- Implementation of management measures that will maintain suitable conditions for kit fox dispersal and potential for residence.
- Research and monitoring that may provide useful information to assist kit fox recovery.

Contributions of UCM mitigation lands to the conservation of vernal pool ecosystems and associated species are listed below.

- Protection of a variety of geographic and ecological conditions for vernal pool species, including the following listed species: succulent owl's-clover, Colusa grass, San Joaquin Valley Orcutt grass, Conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, and California tiger salamander.
- Management of habitat through livestock grazing and other resource programs to maintain and, where possible, enhance habitat conditions and wetland functions for vernal pool species (especially listed species).
- Research and monitoring that will contribute to enhanced management practices for vernal pool ecosystems and species.

Chapter 3
Overview of Area Resources and Management

UCM and CST Conservation Lands (Tier 1 Lands) and Adjacent Campus Buildout Lands have been used primarily for livestock grazing over many years (Appendix B); this use has maintained the lands in generally natural conditions (see *Biological Resources* below). Improvements have been largely limited to fences, roads, stock ponds and other water sources, and a barn located on the Adjacent Campus Buildout Lands. The existing water delivery canals are primarily located on the Adjacent Campus Buildout Lands.

3.1 Biological Resources

Tier 1 Lands were selected for mitigation use on the basis of their biological values. Accordingly, the management requirements for these lands are intended to maintain and enhance values for endangered and other sensitive species and the ecosystems that support them. This section briefly describes these important biological resources. More detailed treatment is provided in the BA (EIP 2002a; Jones & Stokes 2002a); the BO (U.S. Fish and Wildlife Service 2002); and the Conservation Strategy (ICF Jones & Stokes 2008).

3.1.1 Habitats and Communities

Several methods have been used to classify ecosystems, habitats, and plant communities of Tier 1 Lands for the wetland delineation (EIP 2000, 2002b), Wetland Functional Assessment (Gibson and Skordal 2008), and Conservation Strategy (ICF Jones & Stokes 2008). Because the management requirements of this Plan do not require a finely differentiated basis for characterizing habitat conditions, a generalized classification for management purposes is provided below.

3.1.1.1 Annual Grasslands

The vast preponderance of Tier 1 Lands supports annual grassland habitat. This habitat occurs in upland (nonwetland) areas, but several of the characteristic species also invade vernal wetland habitats (vernal pools, swales, and clay slope

wetlands) under conditions of low grazing pressure. Annual grasslands in the project area are dominated by naturalized non-native Mediterranean grasses and forbs, but they also include a component of native species.

3.1.1.2 Native Vernal Wetlands

This category includes vernal pools, swales, pool/swale complexes, mima mound areas, clay slope wetlands, and clay playas as variously described in other UCM documents. These seasonal wetland types occur on soils with low permeability and support wetland species, including a number of the target species identified in the Conservation Strategy.

3.1.1.3 Artificial Wetlands

Artificial wetlands comprise a variety of wetland types with unnatural hydrologic conditions resulting from human activities. Artificial wetlands include stock ponds, irrigation canals, and tailing areas (generally formed by water ponding against or leaking from adjacent irrigation canals). Artificial wetlands generally do not support typical vernal pool plants, although some stock ponds are primary breeding areas used by California tiger salamanders.

3.1.2 Species for Management Emphasis

Nine of the 13 species addressed in the BO occur on UCM Conservation Lands, while five species occur on both CST and Adjacent Campus Buildout Lands. The quantitative distribution of habitat and occurrences for each species are summarized in Tables 3-1 and 3-2; these numbers reflect the 2007 revisions to the campus configuration and allocation of former campus lands to UCM Conservation Lands. Because the status and trends of these species are addressed in detail in the BA, the BO, and the Conservation Strategy, this Plan provides only a brief summary of the species' habitat associations, abundance, management importance, and management requirements.

In the following discussions, the characterizations of relative abundance reflect the abundance in the Plan Area or general region at a broader scale; all are listed species and thus are considered rare and sensitive to threats of potential extirpation.

3.1.2.1 Succulent Owl's-Clover

Succulent owl's-clover grows in a wide range of vernal wetland types. The species is relatively abundant on Tier 1 and Adjacent Campus Buildout Lands (Table 3-1), as well as regionally (ICF Jones & Stokes 2008: Figure 3-8a, b).

Table 3-1. Habitat Acreages for Conservation Species on Conservation Lands and on UCM Campus and University Community Lands

	Extent of Habitat (acres [percentage])[a]								
			UCM Conservation Lands						
Species	Project Region	Campus and University Community [b]	VST	CNR	Myers Easterly	Total UCM[c]	CST Conservation Lands	Tier 2 Conservation Lands	All Conservation Lands
Succulent owl's-clover	1,337	31 (2)	219 (16)	94 (7)	0 (0)	313 (23)	68 (5)	308 (23)	689 (52)
Colusa grass	282	0 (0)	117 (41)	39 (14)	0 (0)	156 (55)	0 (0)	0 (0)	156 (55)
San Joaquin Valley Orcutt grass	156	0 (0)	0 (0)	16 (10)	0 (0)	16 (10)	0 (0)	0 (0)	16 (10)
Conservancy fairy shrimp	107	0 (0)	0 (0)	14 (13)	0 (0)	14 (13)	0 (0)	0 (0)	14 (13)
Vernal pool fairy shrimp	2,384	61 (3)	349 (15)	139 (6)	2 (0)	490 (21)	137 (6)	516 (22)	1,143 (48)
Midvalley fairy shrimp	653	27 (4)	90 (14)	105 (16)	0 (0)	195 (30)	64 (10)	66 (10)	325 (50)
Vernal pool tadpole shrimp	318	4 (1)	14 (4)	0 (0)	0 (0)	14 (4)	0 (0)	0 (0)	14 (4)
California tiger salamander	69,406	1,884 (3)	4,904 (7)	1,254 (2)	84 (0)	6,242 (9)	2,545 (4)	11,349 (16)	20,136 (29)
San Joaquin kit fox (primary habitat)	180,431	1.354 (1)	4,933 (3)	1,156 (1)	91 (0)	6,180 (3)	2,997 (2)	15,082 (9)	24,259 (13)

[a] *Percentage* reflects the percentage of all the habitat type in the project region that is either conserved on conservation lands or removed by Campus Buildout.

[b] The total of each habitat type that would be directly or indirectly affected by development of the entire UCM Campus and University Community

[c] Total UCM Conservation Lands—i.e., the total of VST, CNR, and Myers Easterly lands.

Table 3-2. Numbers of Point Observations of Conservation Species on Conservation Lands and on UCM Campus and University Lands

	Occurrences							
		UCM Conservation Lands						
Species	Campus and University Community[a]	VST	CNR	Myers Easterly	Total UCM	CST Conservation Lands	Tier 2 Conservation Lands	Total
Succulent owl's-clover	9	119	125	0	244	41	454	739
Colusa grass	0	3	2	0	5	0	0	5
San Joaquin Valley Orcutt grass	0	0	1	0	1	0	0	1
Conservancy fairy shrimp	0	0	1	0	1	0	0	1
Vernal pool fairy shrimp	211	190	107	10	307	218	145	670
Midvalley fairy shrimp	19	26	34	0	60	15	12	87
Vernal pool tadpole shrimp	1	4	0	0	4	0	1	5
California tiger salamander	1	8	5	0	13	8	9	30

[a] The total number of point observations of each species that would be directly or indirectly affected by development of the entire UCM Campus and University Community.

Management requirements are for habitat protection and moderate grazing to reduce competition from other species.

3.1.2.2 Colusa Grass

Colusa grass grows in large or deep vernal pools that retain water until late spring. It occurs on the VST Preserve and CNR, but has not been found on the CST or Adjacent Campus Buildout Lands (ICF Jones & Stokes 2008: Figure 3-9a, b). Regionally, the species is uncommon.

3.1.2.3 San Joaquin Valley Orcutt Grass

San Joaquin Valley Orcutt grass grows in large or deep vernal pools that retain water into the late spring or early summer. It is one of the rarer listed species in eastern Merced County, with only eight records reported (ICF Jones & Stokes 2008: Figure 3-10a, b). The species is not present on the CST Conservation or Adjacent Campus Buildout Lands. A single occurrence is protected on UCM Conservation Lands.

3.1.2.4 Conservancy Fairy Shrimp

Conservancy fairy shrimp occurs mainly in large, turbid alkaline pools; vernal lakes; and vernal pools. It is a relatively rare fairy shrimp species, with only 28 known occurrences. Four occurrences are known from eastern Merced County (ICF Jones & Stokes 2008; Figure 3-11a, b). The species was avoided during establishment of the boundaries of the campus. The sole occurrence of Conservancy fairy shrimp on UCM Conservation Lands is within the CNR, where it occupies a large vernal pool. This occurrence is the only protected occurrence in eastern Merced County. Statewide, 10 other sites are protected.

3.1.2.5 Vernal Pool Fairy Shrimp

Vernal pool fairy shrimp is the most widely distributed special-status crustacean in eastern Merced County. It occupies vernal pools and a variety of other seasonal wetland types, including artificial depressions and drainages with suitable hydrology, on Tier 1 and Adjacent Campus Buildout Lands and other lands in eastern Merced County (ICF Jones & Stokes 2008: Figure 3-12a, b). Nearly 48% (1,143 acres) of the known occupied habitat in eastern Merced County is protected in conservation areas associated with the UCM project (including Easement Lands).

3.1.2.6 Midvalley Fairy Shrimp

Midvalley fairy shrimp occupies vernal pools and other seasonal wetland types. It tends to be associated with smaller, more ephemeral vernal wetlands than the other special-status crustaceans. It occurs on Tier 1 and Adjacent Campus Buildout Lands. Compared to the other special-status species, midvalley fairy shrimp is moderately abundant and widely distributed in eastern Merced County (Jones and Stokes 2008, Figure 3-13 a, b).

3.1.2.7 Vernal Pool Tadpole Shrimp

Vernal pool tadpole shrimp occurs in seasonal wetland habitats of widely varying sizes and conditions. A small amount of occupied habitat occurs on the VST Preserve. The species has not been identified on Tier 1b or Adjacent Campus Buildout Lands. Most of the occupied habitat for the species is located immediately southeast of the campus on unprotected lands (ICF Jones & Stokes 2008: Figure 3-14a, b).

3.1.2.8 California Tiger Salamander

California tiger salamander breeds in vernal pools, stock ponds, and other seasonal wetlands that are inundated for an average of 3–4 months annually. Salamanders use aestivation sites, primarily in soil crevices and burrows of ground squirrels and other fossorial mammals, during the nonbreeding season. Salamanders have been reported to travel more than 1 mile from breeding sites; however, evaluation of the levels of use and usage by various age classes that contribute differentially to population reproduction indicates that areas closer to breeding ponds have the highest value to populations (Searcy and Shaffer 2008). Tiger salamander populations in eastern Merced County have shown evidence of genetic contamination from introduced non-native eastern tiger salamanders (Fitzpatrick and Shaffer 2003), although the precise locations sampled in this study and the conditions within Conservation Lands is unknown.

Nearly all surveyed areas of lands of conservation interest in eastern Merced County are occupied tiger salamander habitat, based on the mapping in the Conservation Strategy that characterized lands within approximately 7,000 feet of breeding ponds as occupied (ICF Jones & Stokes 2008: Figure 3-15a, b). Most Tier 1 and Adjacent Campus Buildout Lands are considered tiger salamander habitat under this definition. Only one documented breeding site for California tiger salamander occurs on Adjacent Campus Buildout Lands, but a number of breeding sites are within 1 mile of the proposed campus (ICF Jones & Stokes 2008: Figure 3-15a, b).

3.1.2.9 San Joaquin Kit Fox

The known distribution of San Joaquin kit fox is limited to a few areas in eastern Merced County. It is unclear if this current localized distribution is a result of natural conditions (e.g., unfavorable soil conditions for burrowing, high water table); past land use; and mortality factors (especially rodent control); or the result of current land uses (ICF Jones & Stokes 2008). The *Recovery Plan for Upland Species in the San Joaquin Valley* has identified portions of eastern Merced County as a key dispersal corridor to maintain and restore occupancy of the east side of the San Joaquin Valley (U.S. Fish and Wildlife Service 1998).

Habitat suitability in eastern Merced County was characterized in the Conservation Strategy on the basis of the key variables of land cover type, slope, and adjacent land uses. All Tier 1 Lands and most undeveloped portions of the Adjacent Campus Buildout Lands are considered suitable for kit fox residency and dispersal (ICF Jones & Stokes 2008: Figure 2-2).

3.2 Cultural Resources

No intensive cultural resources surveys have been conducted on Tier 1 Lands for the UCM project. The Campus Long Range Development Plan (LRDP) EIR noted that, based on the presence of archeological sites on adjacent lands, "creek zones and other [natural] water sources in the project area should be considered archeologically sensitive" (UC Merced 2002). The EIR also noted that surveys of "a large block of land to the northeast of the [Campus and Community] project site did not reveal any historical resources." The Adjacent Campus Buildout Lands were extensively surveyed.

Overall, because the preponderance of Tier 1 and Adjacent Campus Buildout Lands are uplands or seasonal wetlands, they are not considered highly sensitive for archeological and historical resources. According to the Draft EIR, the "Smith Trust barn" on the Adjacent Campus Buildout Lands does not appear to qualify for inclusion in the California Register of Historic Resources (CRHR) because it is not associated with important people or events or distinguished by its type or method of construction (UC Merced 2002).

3.3 Visual Resources

The Tier 1 and Adjacent Campus Buildout Lands are not highly visible to off-campus observers because of relatively flat topography and screening by trees at the County's Yosemite Lake Park. The primary visual value of the UCM Conservation Lands is their function as the viewshed for the campus. The area provides sweeping views of open space areas supporting grasslands and vernal pools that provide a sense of space and visual interest to the University Community.

3.4 Livestock Grazing

Lands in the Plan Area have been grazed by livestock for more than 100 years. For many years prior to conveyance to UC, VST, CNR, and Myers Easterly lands were grazed under leases from the trust to a sequence of ranchers. Grazing has typically involved cow-calf and stocker operations that graze from late October through May.

Numbers of grazing animals and the duration of grazing in a given year varies depending on rainfall and other weather conditions (Appendix B). In the relatively dry 2006–2007 grazing season, lands were grazed at an intensity of approximately 1.0 animal-unit-months (AUMs; i.e., the equivalent of grazing by a cow and calf for 1 month) per acre (Appendix B).

UCM leases the VST Preserve for grazing using a competitive bidding process, while TNC administers grazing on the CST. Grazing is conducted in a manner intended to continue the previous practices on the lands, which are considered appropriate for conservation purposes. The grazing lease is monitored regularly for compliance with lease terms.

More detail on these grazing programs is provided in the *UCM Conservation Lands Grazing Management Plan* (Grazing Plan) (Appendix B).

3.5 Fire Control and Management

Fire is an inherent part of California's Mediterranean ecosystems, including the annual grassland–vernal wetland complexes in the Plan Area. Annual grasslands in the project area are not dependent on fire, but experience regular fire as a result of dry conditions during the summer. Most fires that occur are human caused, and typically burn quickly at low to moderate intensity.

Fire suppression on Tier 1 Lands has mostly been the responsibility of the California Department of Forestry and Fire Protection (Cal Fire). No detailed history of fire incidence has been summarized, but conditions are relatively easy to predict on the basis of the area's similarity to many other areas in California. Historical suppression methods were likely of relatively low intensity, commensurate with the relatively low value of resources at risk (primarily livestock forage). Suppression methods likely comprised using existing fuel breaks (e.g., roads, canals) in concert with new fire line construction, wet-lines (spraying a waterline to discourage fire spread), and backfiring.

Since establishment of Phase I campus, fire prevention and suppression efforts have increased to protect UC resources (human population, buildings) and in response to increased threats of ignition posed by the human population (Krippner pers. comm.). UCM annually disks connections with canals and roads to create a fuelbreak around the perimeter of the existing Phase I campus.

Campus police also provide complete fire prevention and detection through routine patrol of the campus perimeter lands.

3.6 Recreation and Prevention of Unauthorized Use

Historically, all lands in the Plan Area were privately owned and not available for general public recreation. Information on past private recreation uses is limited, but uses are believed to be few and carried out at minimal levels. No public recreation use has been authorized on UCM Conservation Lands since acquisition by UC. TNC allows only infrequent guided tours on CST Lands.

UCM monitors and patrols Conservation Lands to protect them from trespass, although relatively little trespassing (and associated resource damage) has occurred. UCM Conservation Lands, especially VST Preserve lands, are regularly monitored for unauthorized uses in compliance with existing environmental permitting requirements. TNC has identified trespass issues on CST Lands associated with unauthorized public access from adjacent Paloma Road.

3.7 Research and Educational Uses

Research and educational uses are restricted in the Plan Area. Procedures for permitting educational and recreation use are in place (Appendix C). UC will continue to employ these procedures, which are incorporated into this Plan, until SNRI adopts and implements its own procedures.

Chapter 4
Plan Purpose and Planning Principles

The broad purpose of the Plan for UCM Conservation Lands is to meet UCM's environmental commitments and agency permit requirements, and to provide a tool for resource managers to protect these lands and associated species of conservation concern. The specific purpose is to provide management direction to guide management over the life of the Plan.

4.1 Overview of Land Use Commitments for UCM Conservation Lands

Management of UCM Conservation Lands is guided by UCM's environmental commitments and agency permit requirements in previous and ongoing environmental approval processes. Because these requirements have been presented and repeated in multiple documents, they are only briefly summarized here. The goals, objectives, and guidance in Chapter 5 provide the direction for implementing these requirements.

4.1.1 Clean Water Act Section 404 Permit

In February 2008, following discussions with USFWS, the U.S. Army Corps of Engineers (USACE), the U.S. Environmental Protection Agency (EPA), DFG, and other interested stakeholders, UCM submitted a revised Clean Water Act (CWA) 404 permit application that proposed a smaller alternative to its previous 910-acre campus footprint to reduce impacts on wetland and biological resources. It also incorporated the previously designated CLR and the eliminated portions of the campus into an expanded CNR, with conservation easements applied. This permit application is the basis for the preparation of an amended joint EIR/environmental impact statement (EIS); a new project-specific BA supplement (Airola 2008), and BO; and revision of supporting documents, including the Conservation Strategy (ICF Jones & Stokes 2008), and Compensatory Wetland Mitigation and Monitoring Plan (Gibson and Skordal 2008). Both previous and current documents provide relevant direction for the Plan, as summarized below.

4.1.2 Biological Assessments, Biological Opinion, and Resource Mitigation Plan

The BA (EIP 2002), the BA supplement (Jones & Stokes 2002a), and the Resource Mitigation Plan (RMP) (Jones & Stokes 2002b) were prepared by UCM as part of the formal consultation process for the project under Section 7 of the federal Endangered Species Act (ESA). These documents promulgated a substantial number of conservation commitments, which served as the basis for the consultation process and USFWS's BO (2002).

The RMP was prepared in close coordination with USFWS and DFG in an attempt to address potential effects of the project on listed species. The RMP provides a broad program of measures that UCM proposed to avoid and minimize take of federally listed or proposed species that could be affected by the UCM project. In this context, the project comprises siting, design, construction, operations and maintenance of the campus and University Community, as well as activities associated with compensation for project impacts. The RMP was incorporated into the BA (EIP 2002).

The operations and maintenance mitigation element of the RMP provides the most relevant guidance to management of UCM Conservation Lands. The RMP identifies the following management measures.

- Develop a detailed management plan (i.e., this Plan) to describe the management and monitoring program to manage and protect listed species and other biological and wetland resources.
- Manage and monitor to control human uses.
- Control dogs and non-native wildlife.
- Control invasive non-native plants.
- Conduct and manage livestock grazing to meet habitat objectives for listed species.
- Control wildfires.
- Monitor populations of Conservancy fairy shrimp and other listed species.
- Adapt and modify protection and management practices in response to monitoring results (Jones & Stokes 2002b:13).

Each of these elements is described in greater detail in the RMP. The specific requirements and additional details of management practices and monitoring are incorporated into Chapter 5, *Management Program Direction*, of this Plan.

The Compensation Element of the RMP describes acquisition of compensation lands. The described goals for this acquisition are summarized below.

- Acquiring, protecting, and improving the quality of habitat for listed species to ensure that take and other project effects are successfully mitigated.

- Avoiding or minimizing any detrimental effects on habitats and populations of other listed and sensitive species.
- Ensuring that a detailed compensation plan is approved by USFWS before any take of federally listed species occurs or their habitats are disturbed (Jones & Stokes 2002b:19**)**.

Key requirements of the RMP Compensation Element are listed below.

- Placing the UCM Conservation Lands under a conservation easement that would impose restrictions on grazing, research, teaching, educational outreach, and recreational uses.
- Confining educational and recreational uses on the VST Preserve to docent-supervised activities and limiting controlled public access for hiking and nature observation along existing ranch roads.

Each of these elements is described in greater detail in the RMP. The specific requirements and additional details of management practices and monitoring are incorporated into Chapter 5, *Management Program Direction,* of this Plan.

Formal consultation by the USACOE with the USFWS under the ESA was reinitiated in July 2008. A BA Supplement (Airola 2008) has been prepared to address compliance of UC's revised Proposed Project with the conditions of the 2002 BO (including the Parameters and Conservation Measures incorporated into the 2002 BA and 2002 BO) and to evaluate effects on listed species and designated critical habitat.

4.1.3 Conservation Easements

Current uses of the VST Preserve and the Myers Easterly property are constrained by the terms of the conservation easements granted to TNC and applied to the lands as part of the mitigation for the UCM project. The Preserve easement documents are provided in Appendix F.

The CNR does not yet have a conservation easement on it. UCM has agreed to place conservation easements on the CNR; easement terms are expected to be similar to those that have been included within the conservation easement for the VST Preserve. Key elements of the VST conservation easements are discussed below.

The conservation easement recognizes the substantial conservation values of the lands, which are defined as "natural, hydrological, biological, ecological, and scientific values." The purposes of the conservation easement are to identify, monitor, study, preserve, protect, manage and, to the extent permitted or required, restore and enhance the conservation values. The easement holder is granted rights to engage in the activities listed below.

- Identify, monitor, study, preserve, protect, and manage the conservation values, consistent with the terms of the conservation easement.
- Access the property in perpetuity.
- Enforce the terms of the easement.
- Study and make scientific observations on the property.
- Participate in the development of this Management Plan ("adaptive management plan") and the protocol for evaluating research proposals.
- Be kept informed by UCM of progress in securing permits from resource agencies.

The VST Preserve easement specifies that the landowner preserve and maintain the conservation values of lands through compatible livestock grazing and other management. The easement restricts property uses and grants the easement holder a perpetual right to preserve, protect, identify, monitor, enhance, and restore the conservation values. The landowner retains the right to pursue a variety of land uses and exercise other rights, as long as they maintain the conservation values of the land. These permitted uses are listed below.

- Livestock grazing conducted according to the terms in Exhibit C, Schedule C-1 (see Appendix F), as listed below.
  - Only sheep or cattle will be grazed, except for use by horses, burros, or mules as needed to service ranching operations and by goats to control noxious weeds.
  - Prevent an increase in noxious weeds.
  - Retain 800 pounds per acre of residual dry matter at the end of the growing season.
  - Locate food supplements (e.g., salt and mineral licks, food supplements, supplemental feed) away from vernal pools.
- Prescribed burning.
- Use of herbicides (only to control non-native noxious weeds).
- Hunting and fishing (by "the landowner" under established regulations with restrictions on fish stocking).
- Control of predatory and problem animals using selective methods that target individuals causing damage.
- Water source maintenance for livestock and wildlife use and development of new water sources with the easement holder's approval.
- Passive recreation, including bird watching, hiking, horseback riding, and picnicking, except as prohibited under resource agency permits.
- Erection of signs.
- Rights to use the property for any purpose consistent with the conservation easement.

Prohibited uses (Appendix F) are listed below.

- Land subdivision.
- Transfer of development rights.
- Non-ranching commercial uses, including development of natural resources (minerals, aggregate, energy).
- Disposal of hazardous waste, refuse, etc.
- Long-term leasing (>5 years) without consent of the easement holder.
- Alteration of water courses, degradation of water quality, or impairment of water rights.
- Off-road vehicle use, except for use in ranching operations, or authorized management and research activities.
- Introduction of plant and animal species.
- Plowing, disking, land leveling, irrigation or other alterations, except disking for fire control as specified in the Management Plan.
- Conversion to crops, orchards, or vineyards.
- Junkyards.
- Destruction of native vegetation (except by grazing or burning).
- Harvesting timber.

4.1.4 Conservation Strategy

The Conservation Strategy (Jones & Stokes 2007) was prepared to fulfill requirements of the BO, and has been updated (ICF Jones & Stokes 2008) to reflect the project status as of the February 2008 404 permit application. The strategy provides guidance to develop and implement conservation measures for species affected by the UCM project. It also describes UCM's implementation of the strategy and the role of the strategy in regional conservation. The Conservation Strategy also provides the most up-to-date record of occurrences of species on conservation lands

The general relationship of the Conservation Strategy to the Plan is described in Chapter 1, *Introduction.* The previous version of the Strategy (Jones & Stokes 2007) identified the role and requirements of the management plan for Conservation lands. In summary, the Conservation Strategy called for preparation and implementation of this Plan for UCM Conservation Lands. It stated that the plan "generally should include" the elements listed below.

- Goals and measurable objectives.
- Maps and descriptions of the management area; compensation habitat on conserved lands; and any areas to be enhanced, restored, or used for habitat creation.

- Description of how conservation lands meet compensation requirements.
- Descriptions of how habitat will be protected in perpetuity and land use restrictions that will prevent incompatible activities.
- Identification of the parties responsible for implementing the Plan.
- Descriptions of and restrictions on recreational, educational, and scientific activities that will be permitted and protocols for approving specific research and educational uses.
- Methods for controlling and eliminating unwanted or illegal uses of the property.
- Details regarding planned habitat restoration and enhancement measures.
- Grazing management practices.
- Fuel management practices.
- Practices for controlling non-native plants and animals.
- Monitoring protocols and procedures for archiving, distributing, and reporting monitoring data.
- Adaptive management measures to adjust management actions based on monitoring results and procedures for reporting adaptive management actions.
- Funding assurances for restoration/enhancement, long-term monitoring, management, and reporting.

Since the preparation of this Conservation Lands Management Plan, the revised Conservation Strategy (ICF Jones & Stokes 2008) has been updated, and the section on the management plan now summarize the Plan contents.

4.1.5 UC Merced Long Range Development Plan and EIR

The LRDP Final EIR (UC Merced 2002) specified the proposed configuration of the campus and designated the former boundaries of the CLR and CNR. Requirements set forth in the Project Description and Mitigation Measures in the Draft EIR have been incorporated into subsequent documents. The LRDP will be modified to reflect the new campus footprint and subsequent environmental commitments. The previous LRDP EIR will be superseded by a joint EIS/EIR for the project to be completed in 2008, but many of the mitigation elements of the EIR will be incorporated into the EIS/EIR.

4.2 Other Needs for Plan Direction

For effective management of UCM Conservation and Adjacent Campus Buildout Lands, direction is needed on a variety of protection and management activities that are not specifically required by project permits and environmental documents. This direction includes practical, on-the-ground management requirements for fire protection, visual and cultural resource management activities, and administrative and education uses. This Plan identifies and incorporates these needs to direct all aspects of land management.

4.3 Planning Principles

At the broadest level, a set of principles governs the development of the more specific goals, objectives, and guidelines for management in the Plan. These major principles govern the desired outcomes of the Plan, as well as the processes by which Plan activities are designed, conducted, and evaluated. These planning principles are listed below.

- Comprehensively address all management needs by providing clear and practical policy-level direction to on-the-ground managers.
- Meet requirements in permits and environmental documents to emphasize protection of wetlands and biological resources.
- Anticipate future campus and community growth in evaluating effects of management decisions and actions.
- Accommodate other uses (research, educational, recreational) to the extent feasible consistent with the primary goals and with available budgetary and management resources.
- Emphasize early problem detection and response to issues before they become large problems.
- Actively collaborate and communicate with the permitting agencies, easement holders, adjacent landowners, and the University Community.
- Adopt an adaptive approach to management based on observation, monitoring, and research.

Chapter 5

Management Program Direction for UCM Conservation and Adjacent Campus Buildout Lands

This chapter provides direction for the management of lands, resources, and uses of the UCM Conservation Lands and Adjacent Campus Buildout Lands. CST Conservation Lands are addressed in Chapter 6. The chapter is organized around the major management programs that will be undertaken. Direction applying to all UCM Conservation Lands is presented first, followed by site-specific direction that applies to specific management units.

Although the guidance is organized by management program, some guidelines may properly apply to more than one program. Such guidelines are cross referenced where appropriate.

5.1 Grazing Management Program

Grazing is the primary management activity that has occurred and will continue to occur on the UCM Conservation Lands. Proper grazing is recognized as an essential tool for managing vegetation to benefit vernal pool plant species, control and prevent invasion by undesirable non-native plant species, provide desirable habitat conditions for target species, maintain and enhance overall wetland functions, and maintain a human presence to discourage trespass and vandalism. In general, it is recognized that historic and recent grazing practices were consistent with maintenance of conservation values (Marty pers. comm.).

5.1.1 Program Goals

The goals of the grazing management program are listed below.

- Maintain a grazing program that continues to provide high-quality habitat conditions for species of conservation concern.
- Utilize historical and recent grazing patterns that are considered beneficial for target species.
- Maintain and enhance overall wetland functions.

5.1.2 Program Objectives

The following objectives are characterized as goals in the Grazing Plan (Appendix B).

- Protect and enhance the biological values of preserved vernal pools and associated grasslands.
- Protect and enhance special-status species habitat.
- Promote the growth and cover of native plants by preventing the introduction and establishment of invasive non-native plant species.
- Remove/control existing invasive plant populations.
- Implement a program of long-term monitoring that will allow management techniques to be continually improved (i.e., adaptive management).
- Maintain the economic viability of livestock operations on UCM Conservation Lands.

5.1.3 Management Guidelines

Management guidelines for grazing are provided in the Grazing Plan (Appendix B). Key aspects of this guidance are summarized below.

G-1. Lessee Selection and Management. Select grazing lessees primarily on the basis of their ability and track record in conducting grazing to meet Plan objectives, rather than on bid price. Award longer-term ($\geq$5-year) leases with appropriate performance standards (subject to approval by the easement holder). Base fees on AUMs to encourage proper stocking and allow flexibility in setting annual grazing animal numbers (i.e., "stocking rates"). Provide incentives for lessee participation in resource management activities (e.g., noxious weed control). Prepare an annual grazing plan with lessees. Document annual levels of livestock use.

G-2. Livestock Type. Graze conservation lands with cattle, except where use of goats may be warranted in concentrated areas to control noxious weeds. Either stockers or cow-calf may be grazed, although differences in patterns of use and needed adjustments should be evaluated for each type of use.

G-3. Stocking Rates. Base initial stocking rates on the grazing capacity analysis described in the Grazing Plan (Appendix B). Adjust annual stocking rates in response to seasonal rainfall and monitoring of forage production by adjusting the numbers of animals or the length of the grazing season. Evaluate and adjust average annual stocking rates to meet conservation goals in consideration of experience acquired during management of the grazing lease.

G-4. Season of Use. Introduce livestock in the late fall or early winter (October–December) when adequate green-up of annual vegetation has occurred,

depending on weather conditions. Remove livestock in late spring (April–June) based on visual analysis of grassland conditions, so as to control invasive species and minimize effects on vernal pool flora.

G-5. Protection for Deep Pool Grasses. Continued grazing without special restriction is considered feasible for areas that support deep pool grasses San Joaquin Orcutt grass and Colusa grass, because populations have persisted under the typical grazing regime used on these lands. If monitoring indicates that detrimental impacts are occurring, managers should evaluate options to remove livestock from areas supporting San Joaquin Orcutt grass and Colusa grass before pools or ponds that support these species begin drying. Livestock removal can be achieved either by removing livestock from entire pastures that support these species or by erecting temporary electric fencing around occupied water bodies.

G-6. Residual Dry Matter Grazing Standards. Meet the residual dry matter (RDM) standard of 800 pounds per acre for grazing at the end of the grazing season to protect soils and mulch for the next year's vegetation (Appendix B, p.13). Coordinate with agencies and easement holder to allow flexibility in meeting standard to account for weather-related variations in forage production and differences in evenness of forage use, as potentially affected by distribution of water and supplements and the type of livestock grazed (stockers or cows and calves).

G-7. Supplemental Feeding. Supplemental foods may be used to improve livestock distribution and to supplement forage during periods of low forage production. Consistent with the conservation easement, food supplements will be placed at least 200 ft from the high water mark of vernal pools; where this distance cannot be met, the minimum distance will be 50 ft. Hay used for feeding will be certified weed-free (see IPM-2).

5.2 Fire Protection and Management Program

The fire protection and management program comprises activities conducted to protect life and property on and adjacent to the UCM campus and UCM Conservation Lands and to protect and maintain natural resource values. The fire protection program responds to the increased risk of fire resulting from the presence of the university and its associated sources of fire ignition, as well as the increased *values at risk* (including life and property) resulting from the proximity of the campus to open grassland habitat. Fire prevention and suppression are also necessary to maintain desirable habitat conditions for target species and to maintain livestock forage to support grazing activities. Prescribed burning may be needed to control noxious weeds.

In applying fire protection, the benefits of resource protection must be balanced with the resource damage caused by fire prevention and suppression methods. Although substantial increases in fire frequency may be harmful to grasslands and associated vernal pool habitats (i.e., by increasing potential for noxious weed

establishment) (Keeley 2001), existing fire frequencies or even moderate increases in frequency at the proper time of year are likely beneficial in controlling medusa-head and other non-native weeds (Pollak and Kan 1998, Marty 2007). Accordingly, use of ground-disturbing prevention and suppression methods (i.e., fuelbreaks and fire control lines) should be minimized to the level needed to prevent substantial increases in fire frequency, and to protect life and property on the campus and other adjacent lands.

5.2.1 Program Goal

The goal of the fire protection and management program is shown below.

- Conduct fire protection and management to protect human life and property, provide for public safety, and protect and enhance ecosystem values.

5.2.2 Program Objectives

The objectives of the fire protection and management program are as follows.

- Provide fire protection that emphasizes protection of life, public safety, and onsite and adjacent property values, particularly those that interface with the campus and other developed areas.
- Prevent a substantial increase in fire frequency and extent from preuniversity conditions in order to maintain habitat conditions.
- Minimize the excavation of fuelbreaks and fire suppression control lines beyond the level necessary to prevent substantial increases in fire frequency or severity.
- Use prescribed fire as a management tool where necessary to control invasive weeds that threaten biodiversity values.

5.2.3 Management Guidelines

5.2.3.1 Fuelbreaks

FPM-1. Fuelbreak Construction. Construct firebreaks to reduce the potential for spread of ignitions to UCM Conservation Lands from adjacent lands and vice-versa. Construct fuelbreaks in spring when soil moisture has declined sufficiently to prevent soil damage (generally late April-early May). Fuelbreaks will be designed and sited in response to the configuration of the campus over the life of the Plan (i.e., adjacent to developed areas) to minimize the area of ground disturbance. Do not construct fuelbreaks around all the property boundaries of conservation lands because the disturbance from repeated fireline construction exceeds the benefit achieved by reducing an already infrequent fire frequency in

remote areas. Design and locate fuelbreaks to incorporate existing protection features (e.g., canals, roads) and the varying level of risk for ignition and fire spread associated with existing land uses. Preferentially use Adjacent Campus Buildout Lands rather than UCM Conservation Lands for fireline construction during the period prior to full campus buildout (Figure 5-1). Note: Implementing the proposed initial fuelbreak will require cooperation of Merced County for use of its lands.

FPM-2. Resource Protection during Fuelbreak Construction. Locate fuelbreak routes to minimize disturbance of wetland areas. Have a qualified botanist flag the initial fuelbreak routes. Use existing trails, fencelines, and other higher use areas (where possible) to reduce disturbance of higher-quality habitats. Do not construct fuelbreaks in areas that remain wet through the fire season (permanent springs and associated wetlands). Evaluate the fuel loads in wetland areas within proposed fuelbreaks to determine if they can safely be left undisturbed. Use non-soil-disturbing techniques to reduce fuels in wetlands within fuelbreaks. In areas where wetlands cannot be avoided, conduct surveys for listed and other sensitive plant species on proposed and alternative routes and select routes that avoid or minimize impacts on these species. Do not construct fuelbreaks in areas that may result in take of state- of federally listed species unless such take is in compliance with the BO.

FPM-3. Fuelbreak Maintenance. Conduct annual maintenance (i.e., disking) during late spring to minimize potential for growth of noxious weeds.

FPM-4. Fuelbreak Monitoring for Noxious Weeds and Erosion. Monitor fuelbreaks annually during spring to identify noxious weed populations (see Guideline IPM-7). Use the updated list of known and potential noxious weeds (see Guideline IPM-1) as target species during fuelbreak monitoring. Use herbicides by hand spraying for targeted treatment of individual plants only if other measures are found to be infeasible.

In general, soil erosion in fuel break areas is not anticipated due to flatness of the terrain. If erosion is detected during surveys for noxious weeds, prescribe modifications to fuelbreak design (relocation, water barring) to reduce erosion. Control erosion through fuelbreak design (e.g., avoid disking perpendicular to steeper slopes; select size and spacing of disks to discourage runoff).

FPM-5. Onsite Protection of Other Developed Lands. If any non-UC campus or University Community lands adjacent to the conservation lands are proposed for development by other parties, strongly assert that any development must mitigate potential fire risks within the developed area rather than rather than necessitating additional protection measures within UCM Conservation Lands.

5.2.3.2 Patrol and Enforcement of Use Restrictions

FPM-6. Fire Prevention Security. The UCM police force will conduct a daily patrol of the campus perimeter to identify trespassers or maintenance activities that could pose a potential fire ignition threat to adjacent UCM Conservation Lands.

FPM-7. Fire Prevention Training for UCM Staff. In spring (March–April) during the period immediately preceding the start of the fire season, campus maintenance personnel who work in outdoor settings will annually review a fire prevention checklist that will focus on specific maintenance duties that could create sources of ignition (e.g., idling of vehicles, welding, use of mowers and other maintenance equipment adjacent to open grassland).

FPM-8. Fire Prevention Planning for Future Construction. Fire prevention plans will be incorporated into all construction and operation plans for future campus construction.

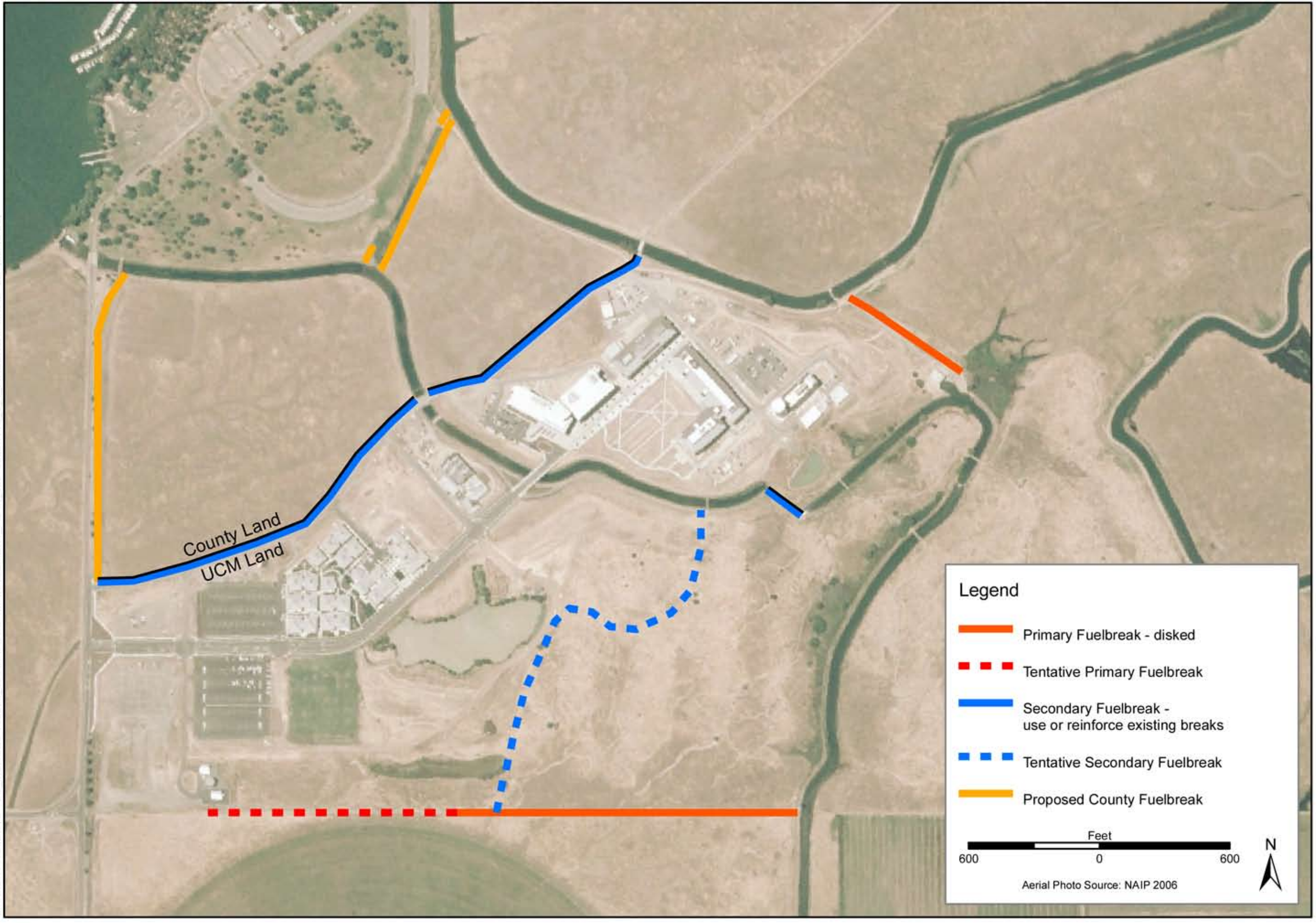
5.2.3.3 Suppression

FPM-9. Fire Suppression Capabilities. UCM will maintain capabilities to suppress grassfires on UCM Conservation Lands though fire protection service agreements with Cal Fire and the Merced County Fire Department. Available equipment will be capable of traveling on UCM Conservation Land roads, trails, and most overland areas. Available equipment will be sufficient to achieve an average fire incident response time of 30 minutes to the UCM Conservation Lands boundary.

FPM-10. Fire Suppression Methods. UCM will incorporate information specifying accepted and priority suppression methods into fire protection contracts with service providers. Suppression methods will give priority to non-ground-disturbing techniques (e.g., wetlines using water) over traditional ground-disturbing fireline construction to minimize disturbance. Use of suppression foam is prohibited. Providers will maintain adequate equipment and water to use in suppression efforts.

FPM-11. Authority over Suppression Operations. SNRI managers will maintain authority to approve suppression actions on their respective UCM Conservation Lands when fire does not pose a substantial threat to life and property. UCM will maintain updated information on the locations of sensitive resources to guide decisions of fire suppression entities so as to minimize disturbance of resource values.

FPM-12. Fire Restoration. Restoration needs for firelines and other areas disturbed during fire suppression activities will be evaluated by an interdisciplinary team within 2 weeks of a fire incident that required ground disturbance for fireline construction. Restoration efforts will be focused on restoring any disturbance of



Jones & Stokes

Figure 5-1
Generalized Fuelbreak System for UC Merced Phase 1 Campus

micro-typography that could alter wetland hydrology preventing erosion and colonization by invasive plant species (see Guideline IPM-7.)

5.2.3.4 Prescribed Fire

FPM-13. Prescribed Fire Uses. Use prescribed fire where appropriate to suppress undesirable weed populations that cannot be controlled through grazing management.

FPM-14. Prescribed Fire Planning and Approval. Prepare detailed burn plans for any proposed use of prescribed fire. Burn plans must meet Cal Fire standards be formally approved by Cal Fire. Plans should include ecological goals of burning, authorized personnel to conduct burning, resource protection measures, a fire safety and burn escape contingency plan, and liability specifications. Conduct interdisciplinary resource planning and prepare an environmental analysis document for all prescribed burns.

5.3 Unauthorized Uses Management Program

The presence of a growing campus and University Community will increase the potential for trespassing and other unauthorized uses on UCM Conservation Lands. The unauthorized uses management program is designed to reduce and control instances of unauthorized use through education and enforcement.

5.3.1 Program Goal

The goal of the unauthorized uses management program is the following.

- Protect UCM Conservation Lands from unauthorized uses though educational outreach and enforcement.

5.3.2 Program Objectives

The objectives of the unauthorized uses management program are listed below.

- Provide a multifaceted educational program for the campus and University Community regarding resource values of UCM Conservation Lands and inform users about restrictions in place to protect resource values.
- Maintain signage, surveillance, and enforcement at levels sufficient to detect, control, and discourage trespass uses on UCM Conservation Lands.

5.3.3 Management Guidelines

UUM-1. Public Education. Maintain a continuous public education program at the UCM campus and University Community to inform students, staff, and members of the general public concerning the sensitive resources within UCM Conservation Lands and the need for their protection. The campaign will use a variety of media, including orientation material to incoming students, outreach through campus publications and other media, interpretive facilities, and boundary signage. Incorporation of information on sensitive resources into educational programs and research (see *Research and Education Uses Program*) is also an integral part of the overall education of students regarding resource values of UCM Conservation Lands.

UUM-2. Training of Security Personnel. Personnel responsible for enforcing prohibitions on unauthorized uses will be regularly trained to ensure they understand use restrictions and reporting requirements for trespass and other infractions.

UUM-3. Public Use Security. The UCM police force will conduct routine daily and nighttime patrols of the campus perimeter to identify trespassers or maintenance activities that could pose a potential fire ignition threat to adjacent UCM Conservation Lands. Incidents of unauthorized entry or activities will be maintained and reported in annual monitoring reports. Police and the SNRI management staff will conduct regular observations of conservation lands from elevated sites (buildings) and by patrol of conservation lands.

UUM-4. Reporting by Authorized Users. Leases and use permits will specify that users promptly report any apparent unauthorized uses of UCM Conservation Lands.

UUM-5. Evaluation of Unauthorized Use Effects. Unauthorized uses other than simple trespassing will be evaluated by the SNRI Land Manager or a qualified individual to assess potential damage to soils, watershed conditions, and biota. Remediation of any resource damage will be conducted according to Plan guidance (e.g., Guideline HE-2)

5.4 Integrated Pest Management Program

A number of plant and animal species pose potential threats to resources of conservation value on Plan Area lands. Threats may occur directly though competition for space and predation or indirectly by affecting other management programs needed to manage habitats (i.e., grazing).

To minimize and avoid detrimental effects, UCM will employ an integrated pest management (IPM) program on UCM Conservation Lands. IPM involves the use of a variety of techniques in an integrated way to control damage from pest species, while minimizing the use of pesticides. The IPM program uses a variety

of means to prevent, detect, treat, monitor, and conduct research on pest species in ways that maximize impacts on target species while minimizing effects on species of conservation value potential safety issues.

This Plan focuses on identifying critical control points for introduction and establishment of pest species and applying management actions directed at these control points. Major modes of introduction and transport of various groups of pest species are shown in Table 5-1. A general strategy for preventing introductions and preventing establishment and spread of pest species is shown in Table 5-2.

Table 5-1. Importance of Various Modes of Dispersal and Introduction of Potential Pest Species Groups

	Modes of Dispersal and Introductions						
Pest Type	Intentional Human Introduction	Incidental Human Introduction	Livestock	Wildlife	Wind	Water	Self Propulsion
Plant	L	H	H	L	H	L	
Fish	H	M		L		M	
Amphibian	M	M		L		H	H
Reptile	M					M	L
Bird							L
Mammal	M	M					M

Notes: Assessment considers irrigation canals as sources of transport but not as a part of UCM Conservation Lands. Importance ratings: H = High, M = Moderate, L = Low.

UCM has prepared a Draft IPM manual for use on campus lands (UC Merced n.d.). While this manual focuses on control of pest species on campus facilities and lands, it also recognizes and incorporates objectives and actions to minimize the introduction and spread of pest species from the campus to conservation lands.

Potential pest species for TNC and UCM lands include a variety of invasive non-native plants, vertebrates, and other life forms (e.g., viruses). Targeted invasive plant species in Merced County (Shoenig and Skurka 2006) are listed below.

- Perennial pepperweed (*Lepidium latifolium*).
- Yellow star-thistle (*Centaurea solstitialis)*.
- Medusa-head (*Taeniatherum caput-medusae).*
- Water hyacinth (*Eichhorinia crassipes*).
- Russian thistle (*Salsola tragus)*.
- Salt cedar (*Tamarix* spp.).
- Poison hemlock (*Conium maculatum)*.
- Milkthistle (*Silybum marianum)*.

- Black mustard (*Brassica nigra*).
- Prickly lettuce (*Lactuca serriola*).
- Barb goatgrass (*Aegilops triuncialis*)

Noxious weeds with the greatest potential for disruption of communities on UCM mitigation lands are yellow star-thistle, Russian thistle, hemlock, milkthistle, black mustard, and prickly lettuce. Additional pest plants, however, are identified regularly, necessitating an active approach to identifying, surveying for, and controlling emerging pest species.

Major vertebrate pest species are mosquitofish (*Gambusia holbrooki*), various non-native warmwater game fish, bullfrog (*Rana catesbeiana*), non-native tiger salamander, non-native turtles, free-ranging and feral cats and dogs, red fox (*Vulpes vulpes*), and wild pig (*Sus scrofa*).

5.4.1 Program Goals

The goals of the IPM program are listed below.

- Develop and adaptively apply a comprehensive program capable of preventing, detecting, treating, and monitoring pest species.
- Conduct research to prevent introduction of noxious and invasive plants and animals into conservation lands.

5.4.2 Program Objectives

The objectives of the IPM program are listed below.

- Implement measures to prevent the introduction of non-native weeds by means of vehicles, equipment, footwear, or livestock feed.
- Maintain an ongoing, continuous monitoring and control program that provides early identification, detection, and control of noxious weeds and invasive non-native vertebrates.
- Maintain ongoing coordination with campus land planners, construction supervisors, and campus landscape management to enact on-campus measures to prevent and control noxious and invasive weeds on campus and University Community lands (and potential spread to Plan Area lands).
- Maintain coordination and consistency with California Noxious and Invasive Weed Action Plan (Schoenig 2005).

Table 5-2. Strategy for Monitoring and Treating Critical Control Points for Integrated Pest Managements

Key Resource	Key Pest Groups	Dispersal and Introduction Method	Critical Control Actions	Critical Control Point Sites	Monitoring Priority
Listed and special-status plants	Noxious weeds	Incidental human introduction	Remove soil and seed from equipment and footwear before entering UCM Conservation Lands Monitor for disposal of plants near UCM Conservation Land boundaries Monitor and control as needed	Lands adjacent to campus and Community, Yosemite Lake Park, LeGrande and Fairfield Canals, Paloma Road	Moderate–High
Listed and special-status plants	Noxious weeds	Introduction in supplemental livestock feed and feces	Require use of certified weed-free supplemental feed for livestock Select supplemental feeding sites on higher ground to minimize introduction of weeds to wetlands Focused weed monitoring at livestock concentration and supplemental feeding sites	Livestock concentration areas and supplemental feeding sites	Moderate
Listed and special-status plants	Noxious weeds	Wind dispersal	Minimize onsite ground disturbance Use certified weed-free materials for erosion control on adjacent construction sites Control weeds on adjacent disturbed construction sites	Livestock concentration areas, disturbed sites (including canals), adjacent construction areas	Moderate
Listed and special-status plants species	Wild pig	Self propulsion, purposeful introduction	Monitor for pig damage. Initiate professional control actions immediately upon detecting pig use	Throughout property, especially at boundaries	Moderate
California tiger salamander	Nonnative reptiles, amphibians, and fish	Purposeful and incidental introduction (including past introduction)	Prohibit fishing in UCM Conservation Land ponds that could encourage introduction of bait fish Prohibit disposal of pet reptiles, amphibians, and fish within UCM Conservation Lands Coordinate with Vector Control District to minimize any potential use of mosquitofish Monitor occupied breeding ponds to detect nonnative species and control introduced populations Modify stockponds that retain water year round to discourage competitive fish, reptiles, amphibians, and non-native eastern tiger salamander hybrids (if present)	Stock ponds and other wetlands	High

Table 5-2. Continued

Key Resource	Key Pest Groups	Dispersal and Introduction Method	Critical Control Actions	Critical Control Point Sites	Monitoring Priority
California tiger salamander	Nonnative reptiles, amphibians,	Self propulsion	Prohibit release of pest species (exotic turtles, bullfrogs, nonnative tiger salamanders) into aquatic habitats on the campus and within the community Control exotic turtles, bullfrogs, nonnative tiger salamanders in aquatic sites on the campus and community Monitor periodically for presence of pest species in adjacent aquatic habitats	Ponds and other aquatic habitats on the Campus and Community	Moderate
San Joaquin kit fox	Domestic and feral dogs and cats	Entry from campus and Community	Maintain effective animal control program on campus and UCM Conservation Lands	Campus and community and immediately adjacent lands throughout UCM Conservation Lands	High
San Joaquin kit fox	Red fox	Generalized range expansion	Initiate trapping and direct control when observed	Throughout UCM Conservation Lands	Moderate

5.4.3 Management Guidelines

5.4.3.1 Prevention of Pest Introduction

IPM-1. Pest Species List. Maintain an up-to-date list of potential pest species based on local, regional, and statewide information. The list should include species included on the California Invasive Plant Council's (Cal-IPC's) invasive species list, as well as emerging new pest species, to facilitate early detection and control. The lists of emerging invasive species should be developed and updated in cooperation with Merced County.

IPM-2. Use of Weed-Free Livestock Supplemental Feed. Require and verify use of certified weed-free hay and other supplemental feed sources for livestock within the Plan Area.

IPM-3. Cleaning of Plant Material from Equipment, Vehicles, and Footware. To minimize introduction of noxious and invasive weeds, require that equipment and vehicles entering the Plan Area from outside the campus and University Community be cleaned prior to entry. The lessee will be required to clean any accumulations of mud from beneath his/her vehicle. An on-campus wash station will be maintained. UCM will require cleaning of footwear by pedestrians prior to entry to the site. These conditions will be incorporated into all use agreements.

IPM-4. Prohibition on Purposeful Introductions of Detrimental Species. Prohibit purposeful introduction of noxious or invasive species or other species that would degrade conservation values of UCM Conservation Lands, including plant species for range forage enhancement and soil stabilization, bait fish, sport fish, mosquitofish, bullfrogs, and wild pigs.

IPM-5. Weed-Free Erosion Control Materials. Require certified weed-free sources for straw and other materials used for erosion control in construction areas.

IPM-6. Prohibition on Use of Invasive Species in Landscaping. Prohibit use of invasive species in landscaping on adjacent lands. Conduct education of landscape personnel and contractors and maintain an up-to-date list of prohibited landscape plant for campus and University Community use.

5.4.3.2 Detection

IPM-7. Early Detection of Pest Species Introductions. Maintain a regular monitoring program for noxious and invasive weeds on conservation lands and undeveloped campus and University Community lands that is adequate to provide early detection and rapid response to control pest species invasion. Emphasize areas where soil is disturbed or exposed, including fuelbreaks, areas adjacent to maintained canals, livestock feeding and watering areas, and burned

areas. If invasive weeds are detected, intensify surveys in the immediate area or in similar sites elsewhere to determine if other populations have invaded.

5.4.3.3 Treatment

IPM-8. Development of IPM Prescriptions for Each Pest Occurrence. Following detection of an invasive species, prepare a prescription describing the extent of the occurrence, potential risks, analysis of control options (e.g., grazing, fire, mechanical, herbicide), effectiveness and risks, and the proposed action and monitoring protocols.

IPM-9. Rapid Response to Control Detected Pest Invasions. Control actions for detected pest occurrences will be initiated quickly to prevent further spread. Timing of treatment will be determined on a species- or occurrence-specific basis.

IPM-10. Mosquito Control. Mosquito control on UCM Conservation Lands will be conducted only where significant threats to human health are demonstrated to exist (based on distance to human populations, mosquito abundance, prevailing winds, and/or other factors). Where control is essential, it will utilize methods that minimize effects on California tiger salamander and aquatic invertebrates. Use of mosquitofish in permanent ponds used by the California tiger salamander or during the period of salamander occupancy of intermittent ponds will require a determination of effects, and possibly take authorization from USFWS. Effects of treatment actions on listed aquatic species should be monitored.

IPM-11. Habitat Management and Direct Action to Control Aquatic Vertebrate Pests. If vertebrate pests (e.g., mosquitofish, bullfrogs) or non-native tiger salamander become established in suitable habitat for California tiger salamander, populations will be controlled using measures that result in the least amount of damage to salamander populations and target plant species. Control methods may include modifying pond configurations to discourage retention of water though the dry season, periodically draining ponds, or other treatment measures during the period when California tiger salamanders are not present (i.e., are aestivating in subterranean refugia) and after any wetland species of conservation concern have set seed or become dormant.

IPM-12. Coordination with Campus Authorities on Pet Control. Avoidance of conflicts between free-ranging pets and conservation species is best achieved through control of pets on campus. Incursions of free-ranging dogs will be minimized through enforcement of animal control regulations on the campus (UC Merced n.d). The SNRI land manager will coordinate regularly with the Public Safety Office to provide feedback and suggestions on pet control incidents, general pet control needs, and effectiveness of pet control techniques.

IPM-13. Direct Control of Non-native Terrestrial Vertebrate Pests. Upland terrestrial species that may pose threats to vertebrates of conservation concern,

approved management programs, or surrounding ecosystems may be directly controlled on site. Species that may be directly controlled include free-ranging dogs and cats, non-native red fox, and wild pigs. Incursions of free-ranging dogs will be minimized through enforcement of animal control regulations on the campus (see IPM-12). Land managers and grazing permittees will be authorized to shoot or otherwise eliminate any free-ranging dogs that harass livestock or wildlife, in accordance with relevant state and local laws. Control actions for non-native carnivores cannot include poisoning because of potential for effects on San Joaquin kit fox. Wild pigs will be immediately removed through trapping, shooting, or poisoning by a qualified and licensed pig control specialist. European starling (*Sturnus vulgaris*) and house sparrow (*Passer domesticus*) are considered infeasible to control in the Plan Area, but populations on campus should be minimized through design to discourage nesting in buildings.

IPM-14. Control of Non-native Rodents. Norway rat (*Rattus norvegicus*), black rat (*Rattus rattus*), and house mouse *(Mus musculus*) are likely to become localized inhabitants in lands adjacent to human dwellings and other buildings. They are difficult to control; at typical population levels, they are not considered a substantial threat to native species. Control efforts will focus on suppressing populations through on-campus efforts to protect human health (i.e., limitation of nesting sites, reduction in food availability, direct population control) (UC Merced n.d.).

IPM-15. Control of Native Rodents. Native rodents (ground squirrels [*Spermophilus beecheyi*], gophers [*Thomomys* spp.], voles [*Microtus* spp.]) are generally not considered pest species subject to control on UCM Conservation Lands, except in localized situations where they pose a direct threat to human health or important facilities. Use of rodenticides is prohibited under the terms of the VST easement. In particular, ground squirrels will not be controlled along farm roads or stock pond dams on VST lands. Any treatment to control rodents will avoid rodenticides that may be harmful to kit fox or other sensitive species. If any use of rodenticides is necessary on Adjacent Campus Buildout or CNR Lands to control rodent-transmitted diseases that could spread to the campus population, such application will be conducted in strict accordance with label instructions to minimize exposure of nontarget species and will be approved by USFWS.

5.5 Research and Educational Uses Program

The research and educational uses program allows scientific research and educational uses on UCM Conservation Lands while ensuring that these uses do not compromise the conservation and mitigation obligations for these lands. These programs are administered separately by TNC for the CST lands and UCM for the VST Preserve, CNR, and Adjacent Campus Buildout Lands. Research administration will also differ for UCM lands under the University of California Natural Reserve Program, if any UCM Conservation Lands are so designated.

Approved research and educational uses differ for UCM Conservation Lands and Adjacent Campus Buildout Lands.

5.5.1 Program Goals

The goals of the research and educational uses program are listed below.

- Provide opportunities for controlled scientific research on UCM Conservation Lands that contribute to basic knowledge and information useful for conservation management.
- Provide opportunities for UCM students and other students to learn about wetlands and other natural resources associated with grassland-wetland habitats.

5.5.2 Program Objectives

The objectives of the research and educational uses program are listed below.

- Ensure that all research and educational uses protect resource values of UCM Conservation Lands.
- Encourage research that provides both basic scientific information and information relevant to management to maintain environmental values of UCM Conservation Lands.
- Provide educational opportunities for UCM students, other student groups, and the general public to learn about and appreciate resources of vernal pool–grassland habitats.

5.5.3 Management Guidelines

5.5.3.1 Research Uses

REU-1. Appropriate Research Activities. Research conducted on UCM Conservation Lands must meet the following general conditions.

- Meet rigorous standards of scientific methods and merit.
- Address research questions including but not limited to those involving listed species, associated species, their habitats, and underlying physical and biological processes that contribute to an understanding and ultimately to the conservation of the species.

- Avoid or limit incidental take or other effects on listed species and their habitats to the minimum level feasible and consistent with limitations in the BO.
- Limit intentional take of listed species for scientific purposes to the minimum level necessary to address study objectives identified in an approved research proposal.
- Does not result in the introduction of non-native species.
- Ensure that any take for research purposes is authorized by USFWS under an approved ESA Section 10(a)(1)(B) permit for take for scientific purposes.
- Allow placement on conservation lands of measurement and sampling devices that are necessary to conduct approved research or educational uses and meet other requirements to minimize effects.
- Allow creation of grazing enclosures or exclosures as needed to protect research equipment or study grazing effects.

REU-2. Priorities for Locating Research Activities. From a resource protection standpoint, the priority locations for research use on UCM's lands (from most to least desirable) are Adjacent Campus Buildout Lands, CNR (outside the watershed of the Conservancy fairy shrimp pool), VST Preserve, and CNR (within the watershed of Conservancy fairy shrimp). Long-term research efforts, however, may require use of permanently protected lands. Research proposals should justify the use of lands outside Adjacent Campus Buildout Lands (e.g., needs for long-term studies that extend beyond the campus construction period, requirement for isolation from adjacent disturbance, needs for a large area or for conditions not supported on Adjacent Campus Buildout Lands) before such use is approved.

REU-3. Research Activities on Adjacent Campus Buildout Lands. Research activities on Adjacent Campus Buildout Lands can be less restricted because of the eventual development of, and "take" authorization granted for, these lands. Research on Adjacent Campus Buildout Lands should meet the following conditions.

- Research should meet the same requirements as listed for UCM Conservation Lands (see REU-1), except for specific approved uses.
- Some research that may be inappropriate for UCM Conservation Lands may be considered more appropriate for Adjacent Campus Buildout Lands, including experimental treatments that do not pose risks to resources on adjacent lands. Such research may include experimental treatments such as those listed below.
  - Evaluating effects of campus construction (e.g., impacts of noise, dust, and hydrologic disruption on species).
  - Testing methods to reduce construction impacts to improve their effectiveness (e.g., transplantation and seed collection for special-status plants, erosion control).

- Evaluating experimental land management methods for potential use on UCM Conservation Lands (e.g., fire control measures, prescribed burning and other IPM measures, experimental grazing regimes).

REU-4. Evaluation and Approval of Research Proposals. All research uses for UCM Conservation Lands will be approved by the SNRI land manager. The protocol for evaluation of research proposals is included in Appendix C. Individuals proposing research will submit a formal request for use with a research proposal. All approved research projects will have an approved research permit that identifies relevant conditions to minimize potential impacts on resources. In summary, the evaluation criteria listed below will be applied to research proposals.

- Sensitivity of the proposed site.
- Potential impacts of the activity on natural systems.
- Potential impacts on present or long-term research and educational uses.
- Compliance with laws, regulations, and project environmental commitments.
- Feasibility and scientific merit.
- Applicant's academic credentials.
- Certification of funding approval.
- Availability of suitable alternative sites.
- Compatibility with current leases and other uses.
- Potential conflicts with construction activities or creation of hazardous conditions.

REU-5. Availability of Research Results. To support management activities, results of research conducted on UCM Conservation Lands will be made available within a reasonable time period to UCM Conservation Land managers, the easement holder, and the agencies, consistent with the need to maintain researchers' rights to proprietary data. Reports approved for distribution will be made web accessible. Specific terms of information sharing will be outlined in the permit for each research project.

5.5.3.2 Educational Uses

The following guidelines govern general educational uses of UCM Conservation and Adjacent Campus Buildout Lands (i.e., other than formal research uses addressed above).

REU-6. Accepted Educational Uses—UCM Lands. Adjacent Campus Buildout and UCM Conservation Lands are available for supervised educational uses by university classes, as well as other users, including primary and secondary schools, youth groups, adult education, and other organized groups. Educational uses of UCM Conservation Lands are intended to be focused on

environmental values of the lands (e.g., basic biology, ecology, hydrology, geology, soil science, range management). The lands are not to be used for general purposes that could be met in less sensitive lands.

Priority locations for nonresearch educational use of UCM's lands (from most to least desirable) are Adjacent Campus Buildout Lands, CNR (outside Conservancy fairy shrimp watershed), VST Preserve, and CNR (within Conservancy fairy shrimp watershed). Educational use proposals should justify the use of lands outside the Adjacent Campus Buildout Lands. Use of the Adjacent Campus Buildout Lands for research may be infeasible where such uses conflict with, or would be compromised by, campus site preparation activities (including advanced tree planting) and construction.

REU-7. Educational Use Areas for UCM's Lands. Nonresearch educational uses are to be restricted to the Adjacent Campus Buildout Lands and designated areas of the CNR and VST Preserve to minimize impacts on resource values and avoid conflicts with approved research projects. Over time, as the campus is constructed, additional lands may be needed for educational uses to replace those lost to campus development and to serve a larger campus population. These needs should be reevaluated over time, and this Plan can be amended, as needed, with appropriate approvals.

REU-8. Approval Process and Requirements. All proposed educational uses require issuance of an annual education use permit by SNRI land managers. Applicants will submit a permit form (Appendix C) describing the desired use, its educational purpose, areas proposed for use, methods to be employed, measures to be incorporated to ensure protection of resource values, and disposition of any resulting data relevant to land management. Permits may be renewed annually if all terms have been met.

REU-9. Supervision of Educational Use of UCM Lands by Non-UC Groups. In addition to other guidelines applicable to all users, a trained environmental monitor provided by the SNRI land manager's staff will accompany non-UCM groups during use of UCM Conservation Lands.

5.6 Habitat Protection and Enhancement Program

The habitat protection and enhancement program consists of the broad categories of activities listed below.

- Measures to minimize, evaluate, and restore authorized or unauthorized human disturbance of soils and watershed conditions.
- Required or discretionary enhancement activities to improve or maintain habitat for wildlife and plant species and overall wetland functions.

The primary habitat enhancement program activities are construction of artificial kit fox dens and maintenance of stock ponds (see related management actions in

Appendix B). A related action occurring outside the Plan Area is installation of a canal crossing to enhance kit fox movements. A variety of other management activities that may enhance the overall value of habitats (e.g., grazing, fire control, invasive species control) are addressed in the discussions of other management programs in this chapter.

5.6.1 Program Goals

The goals of the habitat protection and enhancement program are listed below.

- Restore habitat function of areas of ground disturbance following completion of disturbing events.
- Enhance habitat quality for San Joaquin kit fox to meet requirements of the BA by providing artificial dens.
- Allow other wildlife enhancements that would not be detrimental to other target biological resources.

5.6.2 Program Objectives

The objectives of the habitat protection and enhancement program are listed below.

- Implement measures to minimize and restore areas of habitat disturbance.
- Construct eight artificial dens on UCM Conservation Lands to enhance habitat and provide protection for San Joaquin kit fox from free-ranging dogs.
- Allow artificial nesting sites to be placed for burrowing owls and nesting boxes to be erected for other cavity-nesting birds (e.g., bluebirds, swallows, wood ducks).

5.6.3 Management Guidelines

HE-1. Authorized Temporary Ground Disturbance. The following guidelines apply for all authorized activities that result in temporary ground disturbance (e.g., HE-3, *Construction of Kit Fox Burrows*, but not ongoing programs such as FPM-1, *Fuelbreak Construction*).

- Conduct required predisturbance surveys for target plan species (Table 3-1) and for suitable burrows for sensitive wildlife species. Preferentially select sites that do not support suitable burrows or dens for target species.
- Minimize the amount of area disturbed.
- Avoid wetland areas.

- Temporarily store top 6–10 inches of topsoil to replace after completion.
- Evaluate whether it is necessary to seed and/or mulch disturbed areas, and if so, use plant materials collected on site or from immediately adjacent areas.
- Use certified weed-free sources of local annual grassland mixture for reseeding where collection of plant materials from onsite or adjacent sources is not feasible or desirable.

HE-2. Evaluate and Restore Unauthorized Disturbances. Evaluate areas where unauthorized ground-disturbing uses are detected to assess damage to resources. Prescribe treatments to minimize damage and restore habitat functions, and conduct treatments with follow-up monitoring to assess effectiveness.

HE-3. Construction of Kit Fox Burrows. As required in the project BO, construct eight artificial burrow sites for San Joaquin kit fox on VST Preserve lands, at least 0.5 mile from the edge of the ultimate campus perimeter. Each den will be constructed of 6- by 12-inch diameter polyethylene drainage pipe connected to a plastic valve box (approximately 24 by 12 by 18 inches) to serve as a den chamber. Locations and final design will be approved by USFWS.

HE-4. Other Structural Habitat Improvements. Allow installation of secure artificial nest chambers for burrowing owls and nest boxes for bluebirds, tree swallows, wood ducks, and other species that will not disrupt existing grassland species communities. Box designs and locations should be selected to discourage use by non-native European starlings or house sparrows. To avoid potential conflicts with conservation species, nest structures should not be installed that could be used by Canada geese, nesting raptors, raccoons, or other mammalian predators.

5.7 Recreational and Other Public Uses Program

In general, recreation for the campus and University Community populations will be provided within the campus and University Community. Recreation and general public uses are not emphasized uses of UCM Conservation Lands but limited uses are permitted under the terms of the VST conservation easement. Recreation is more appropriate as an interim use on Adjacent Campus Buildout Lands because their resource values will eventually be eliminated through development of the campus.

Any recreational uses of UCM Conservation and Adjacent Campus Buildout Lands must be carefully managed to avoid impacts on resource values and on other management programs (livestock grazing, education and research, fire protection, and IPM). Recreation needs for the campus are relatively low at present (2007) because of the small student population, but they are expected to grow as the campus and enrollment grow. Consequently, the recreational use program and management direction in this Plan are intended for an interim period

of 5 years. At that point, recreation needs, effects, and management strategies may need to be revised.

5.7.1 Program Goals

The goals of the recreational and other public uses program are listed below.

- Provide recreational opportunities that are consistent with resource protection and management needs.
- Allow only those recreational uses on UCM Conservation Lands that would not diminish biological resource values or conflict with other required management activities.

5.7.2 Program Objectives

The objectives of the recreational and other public uses program are listed below.

- Provide opportunities for low-intensity recreation uses (hiking, running, nature study) on UCM Conservation Lands.
- Emphasize resource protection in all recreation use decisions on UCM Conservation Lands.
- Focus the recreation management program on an initial interim period of 2007–2012, with a subsequent plan revision.
- Focus consideration of more intensive recreational uses on Adjacent Campus Buildout Lands (because impacts of campus development are already incorporated into mitigation).
- Consider long-term implications of creating recreation demands before allowing interim use of Adjacent Campus Buildout Lands for recreation.
- Ensure that management requirements for a recreational use program do not result in allocation of funds needed to perform other resource management and monitoring efforts required by project mitigation.
- Focus recreation programs to serve the recreation needs of the campus and University Community.
- To the extent feasible, provide any offered recreational uses on an equal-access basis to users of a wide range of physical abilities.
- Monitor effects of recreation use, for use in adaptive management.

5.7.3 Management Guidelines

Management guidelines are provided separately for different groups of properties.

5.7.3.1 UCM Conservation and Adjacent Campus Buildout Lands

R-1. Restrict Recreation Uses to Those Low-Intensity Uses that Cannot Be Accommodated within the Campus and Community. Consideration of recreational uses on Plan Area lands will be limited to those uses that cannot be accommodated within the campus and University Community. In general, applicable uses are those that require or substantially benefit from natural lands or open space conditions. Examples of potential recreation uses that may be considered appropriate include hiking, birding, botanizing, trail running, and stargazing. Such uses will provide reasonable handicapped access.

R-2. Prohibited Uses. The following recreational activities and uses are prohibited as recreational uses. The list represents potential uses that may be likely to be requested, but is not a complete list of prohibited uses.

- Motorized vehicles.
- Fireworks, stoves, campfires, barbeques, and other activities that could create sources of fire ignition.
- Pet exercise or training.
- Plant collecting (except for scientific purposes).

R-3. Restrictions to On-Trail Use. Low-intensity uses will be restricted to existing roads and trails.

R-4. Application for Use. Potential recreation users must submit a request for use of UCM Conservation or Adjacent Campus Buildout Lands (Appendix C); the SNRI land manager will evaluate and either approve or deny each request.

R-5. Evaluation of Biological Effects and Agency Approval. Although recreational uses are not entirely precluded on UCM Conservation Lands, higher intensity uses are discouraged. Any proposed recreational uses will require careful evaluation of potential direct and indirect effects on wetland and federally listed species prior to approval. If the biological evaluation demonstrates potential for damage to wetland habitats or take of listed species, UCM will either deny the proposed use, modify the use to avoid these effects, or consult with the regulatory agencies to acquire approval for the activity. The costs for any consultation and permitting should be expected to be borne by the use applicant.

R-6. Recreation Plan Element Revision. This recreation program should be revisited within 5–10 years of Plan approval. An accelerated schedule for program reevaluation is warranted because expansion of the campus may reveal additional needs or conflicts that should be resolved in the Plan.

R-7. Restricted Recreation Use of UCM Conservation Lands. Recreation use is not precluded under the terms of TNC's easement on VST lands. Generally,

recreation use will be limited on UCM Conservation Lands. Recreational uses will be allowed on these lands only if the following criteria can be demonstrated.

- Their need cannot be fulfilled on campus and University Community lands or other non–UCM Conservation Lands.
- They will not result in impacts on biological resources or other management uses.
- Adequate supervision will be in place to minimize any detrimental effects.
- Monitoring will be conducted to detect any detrimental effects and to inform the permitting process.

R-8. Focused Recreation Use on Adjacent Campus Buildout Lands. Because the Adjacent Campus Buildout Lands are slated for eventual development, and because the effects of this development have already been evaluated and mitigated, these lands are considered substantially less sensitive than UCM Conservation Lands. Consequently, Adjacent Campus Buildout Lands should be considered first for proposed uses that require natural or open space lands. Other (i.e., UCM Conservation) lands should be considered only if the uses cannot be accommodated on Adjacent Campus Buildout Lands. Potential reasons for approving recreational uses of Adjacent Campus Buildout Lands could include the following.

- A need for an area of land that exceeds that available on the Future Campus.
- A need for special land characteristics that do not occur on the Future Campus.
- The use would conflict with campus construction or operation.

5.8 Cultural Resources Management Program

As noted in Chapter 3, no extensive cultural resources surveys have been conducted on UCM Conservation Lands because no substantial actions are proposed that would result in land disturbance. Based on surveys conducted on Adjacent Campus Buildout Lands and other sources, the preponderance of UCM Conservation Lands are not considered highly sensitive for archaeological and historic resources.

Limited potential exists for disturbance of archeological and historical resources during those few management actions that may result in ground disturbance, such as fuelbreak construction, stock pond maintenance, road maintenance, and soil disturbance to control noxious weeds. Therefore, management direction to protect cultural resources has been incorporated into the Plan.

As it pertains to Adjacent Campus Buildout Lands, this program addresses only interim measures to protect cultural resources prior to campus development. Measures to protect cultural resources during campus construction are addressed in the LRDP EIR (UC Merced 2002).

5.8.1 Program Goals

The goal of the cultural resources management program is shown below.

- Protect any sensitive cultural resources during implementation of other management and research activities on UCM Conservation Lands.

5.8.2 Program Objectives

The objectives of the cultural resources management program are listed below.

- Preserve and protect significant cultural resources
- Provide for appropriate research and educational uses of UCM Conservation Lands for cultural resources.
- Maintain relationships with Native Americans who have ancestral ties to UCM Conservation Lands.
- Ensure that interim management of the barn and other historic and cultural resources on Adjacent Campus Buildout Lands are managed in accordance with requirements of the LRDP EIR (UC Merced 2002) and the forthcoming EIS/EIR.

5.8.3 Management Guidelines

CR-1. Prevention of Vandalism of Cultural Resources. Protect cultural resources on site from vandalism through ongoing trespassing surveillance and enforcement and through monitoring of permitted uses.

CR-2. Cultural Resources Inventory. The SNIR land managers will maintain a confidential record of any known sensitive archeological and historic resources and their locations. Managers will use this information to evaluate potential effects of proposed management, research, and educational activities and as a focus for law enforcement.

CR-3. Records Search Requirements before New Ground Disturbance. Review the cultural resource inventory to identify potentially significant resources prior to approval of any ground disturbance associated with management activities or research.

CR-4. Surveys and Evaluation prior to Ground Disturbance. Qualified cultural resource specialists will examine any previously disturbed sites proposed for ground disturbance in excess of 0.2 acre. Any archeological or historical resources will be recorded and evaluated using standard procedures.

CR-5. Cultural Resources Protection during Ongoing Management Activities and Permitted Uses. Avoid disturbing significant cultural resources

sites and sites of unknown significance from ground disturbance during ongoing management activities (e.g., fuelbreak design, construction, and maintenance) and permitted uses.

CR-6. Mitigation Requirements where Sites Cannot Be Avoided. If identified cultural resource sites cannot be avoided or if the boundaries of a site are unknown, consult a qualified archaeologist (including tribal experts designated by the tribe) for mitigation recommendations. Mitigation measures may include performing subsurface testing to determine the extent of a site, recovering data through research and excavation, or "capping" sites with a protective layer of material.

CR-7. Procedures for Accidental Discoveries. Document existing procedures to be used if potentially significant cultural resources or human remains are discovered accidentally, and regularly review and update these procedures.

5.9 Visual Resources Program

The UCM Conservation and Adjacent Campus Buildout Lands provide an important natural viewshed for the campus. The visual value of these lands will increase as buildout occurs and more people occupy the campus. Also, the lands of greatest importance will change, as campus growth eliminates natural lands adjacent to previously developed portions of the campus and causes former background lands to become the foreground for new campus areas.

5.9.1 Program Goal

The goal of the visual resources program is shown below.

- Protect any visual resources during implementation of management and research activities on UCM Conservation and Adjacent Campus Buildout Lands prior to their development.

5.9.2 Program Objective

The objective of the visual resources program is shown below.

- Evaluate potential effects of management actions and permitted uses on visual resources of UCM Conservation and Adjacent Campus Buildout Lands, and minimize potential detrimental effects.

5.9.3 Management Guidelines

VR-1. Visual Resource Sensitivity Map. Prepare a map showing lands that are within the viewshed of the existing and future campus and that therefore warrant priority visual resource consideration in planning and implementing management programs and permitting uses. Separately designate areas of current high visual sensitivity (i.e., to occupants of the current campus facilities) and of future sensitivity (i.e., within areas visible from future facilities). Update this map in response to changes in the campus footprint as development proceeds.

VR-2. Visual Resources Protection for Management Actions and Permitted Uses. Consider effects on visual quality during planning and implementation of management actions and in evaluating research and other permitted uses. Seek ways to minimize effects on visual quality, while meeting needs for other management actions and uses. Notwithstanding the eventual need for disturbance to construct on Adjacent Campus Buildout Lands, to the extent feasible, maintain visual resource quality during the interim period prior to construction.

5.10 Interjurisdictional Coordination Program

This program differs from others in that it focuses on interactions of the SNRI land managers with external authorities and managers. In addition to simply maintaining good relations with neighboring landowners and land use authorities, this program is intended to ensure that the potential effects of actions on adjacent lands are recognized and that the SNRI managers provide input to protect mitigation lands from adverse effects.

5.10.1 Program Goal

The goal of the interjurisdictional coordination program is shown below.

- Maintain communications and cooperative relationships with adjacent landowners and managers and with authorities with jurisdiction over UCM lands to minimize detrimental effects of management actions on conservation resources.

5.10.2 Program Objectives

The goals of the interjurisdictional coordination program are listed below.

- Communicate and coordinate with owners, managers, and authorities of adjacent lands to minimize detrimental effects on UCM Conservation Lands and conflicts with adjacent landowners and to learn from each other's management experiences.

- Provide regular communication to easement holders and regulatory agencies as required by permits, easement terms, and other environmental commitments.

5.10.3 Management Guidelines

IC-1. Sharing of Management Information. Regularly share information between UCM, managers of adjacent lands, and easement holders regarding management practices, research and monitoring results, and adaptive management changes.

IC-2. Maintenance of Contacts with Adjacent Landowners and Jurisdictions. Make regular informal contacts with surrounding landowners and land management authorities, including County Parks (Yosemite Lake), irrigation districts, the Merced Mosquito Abatement District, other agencies, and private landowners, to learn about proposed management actions and offer assistance to minimize their effects. Seek opportunities to collaborate on and share management responsibilities across property lines to improve efficiency and reduce potential resource impacts.

IC-3. Monitoring of Adjacent Uses. Monitor land use proposals and land management actions of UCM, the University Community, the City of Merced, and Merced County, and provide input to ensure that the protection and management needs of UCM Conservation Lands are recognized and addressed.

IC-4. Submission of Compliance Reports. Submit regular compliance reports as specified in project permits and environmental documents

Chapter 6

Management Direction for CST Conservation Lands

The management program for CST Conservation Lands is consistent with the overall mitigation approach: to acquire and protect lands with high resource values and maintain the long-term management activities that have created and maintained these values. The primary protection provided to CST lands is the granting of a conservation easement with standard provisions required by the USFWS and DFG. Thus, management direction in the plan for CST lands focuses on provisions to be included in the proposed easement and on guidance regarding its administration to ensure protection of conservation values.

6.1 Protections Incorporated into the CST Conservation Easement

This section summarizes expected CST easement requirements to ensure consistency with USFWS and DFG standard easement provisions. The CST easement provisions included here could change prior to final adoption; such changes will be incorporated into a final version of this Plan.

6.1.1 Terms Expected to be Common to Easements for CST and Tier 2 Conservation Lands

The basic terms of the CST easement will require that the landowner preserve and maintain the conservation values of lands through compatible livestock grazing and other management practices. The easement will restrict property uses and grant the easement holder a perpetual right to preserve, protect, identify, monitor, enhance, and restore the conservation values. The landowner will retain the right to pursue a variety of land uses and exercise other rights, as long as they maintain the conservation values of the land. These permitted uses are listed below.

- Livestock grazing, subject to the following requirements.
  - Prevent an increase in noxious weeds.

  - Retain 800 pounds per acre of residual dry matter (RDM) at the end of the growing season.
  - Locate food supplements (e.g., salt and mineral licks, food supplements, and supplemental feed) away from vernal pools.
- Prescribed burning.
- Use of herbicides (only to control non-native noxious weeds).
- Occupancy of existing residential dwellings.
- Ability to plant and maintain gardens and raise other farm animals and pets that are confined to residential areas.
- Hunting and fishing (with restrictions on fish stocking).
- Water source development and maintenance for livestock and wildlife use.
- Passive recreation.

Prohibited uses are listed below.

- Land subdivision.
- Transfer of development rights.
- Non-ranching commercial uses, including development of natural resources (minerals, aggregate, energy).
- Disposal of hazardous waste, refuse, etc.
- Junkyards.
- Long-term leasing.
- Alteration of water courses, degradation of water quality, or impairment of water rights.
- Off-road vehicle use, except for use in ranching operations.
- Introduction of plant and animal species.
- Plowing, disking, land leveling, irrigation, or other alterations, except disking for fire control.
- Conversion to crops, orchards, or vineyards.
- Destruction of native vegetation (except by grazing or burning).
- Harvesting timber.

The easement holder will be granted the rights listed below.

- Reserve, protect, identify monitor, enhance, and restore in perpetuity the conservation values of the land.
- Conduct evaluations of wetland quantity and quality, evaluate habitat quantity and quality, survey for threatened and endangered species, and monitor their populations.

- Access the lands to monitor, assess compliance, and take all actions necessary to achieve the terms of the easement.
- Install and maintain signage.
- Employ controlled burning, pesticides, or other means to control noxious weeds (if grazing is found to be ineffective).
- Fence riparian habitats.

6.1.2 Additional Requirements Expected in the CST Easement

Consistent with the standard terms for conservation easements required by USFWS and DFG, the CST Easement Lands are expected to incorporate the provisions listed below.

- Access by the permitting agencies (USFWS, DFG) to the CST Easement Lands will be permitted to verify that the easement holder is enforcing the terms of the conservation easement and to facilitate frequent and flexible monitoring of resource conditions and management practices. This access will be coordinated through the easement holder with reasonable time allowed to arrange access.
- The CST conservation easement holder will submit regular and timely compliance monitoring reports to the permitting agencies and UCM.

Other provisions may be added during development of the specific easement language.

6.2 CST Easement Administration

The easement holder will conduct variety of routine tasks to administer easements. These activities are listed below.

- Annually remind the CST landowners of easement responsibilities and identify the easement holder's easement administrator.
- In the event of a proposed land sale, ensure that future landowners are notified of easement requirements.
- Coordinate regular monitoring to assess compliance with the terms of the conservation easement (see Chapter 7).
- Provide results of monitoring efforts to landowners, permitting agencies, and UCM.
- Coordinate with landowners to adjust their management activities in accordance with the terms of the easement.

Beyond strict legalistic administration of the easement, it is important that easement administrators maintain cooperative, goodwill relationships with the CST landowner and UCM (as the adjacent VST landowner) to facilitate beneficial resource management.

Chapter 7
Monitoring and Reporting

Monitoring programs for UCM and CST Conservation Lands differ in intensity, due to the difference emphasis on fee title ownership and management and reliance on a conservation easement for land protection. Consequently, the monitoring programs are discussed separately for the two categories of conservation lands.

7.1 UCM Conservation Lands

UCM has committed to a monitoring program for UCM Conservation Lands to demonstrate its compliance with environmental commitments and permit requirements and to evaluate the effectiveness of measures undertaken to protect and enhance resources. Key elements of an effective and efficient monitoring program for the UCM Conservation Lands are shown below.

- An appropriate measure of the baseline (preproject) conditions.
- An effective system for monitoring and reporting compliance with Plan requirements.
- A program to evaluate the effectiveness of management measures in achieving the desired resource conditions.

The monitoring program is designed to provide a level of focus, effort, and cost that is commensurate with the levels of uncertainty and potential for any substantial unintended consequences. Thus, the level of monitoring effort to assess potential outcomes that are more likely to occur and have greater potential impacts on resources will receive higher priority than efforts to assess other potential outcomes that are unlikely to occur or not likely to have significant consequences. The monitoring program also must be adaptive, because the potential for impacts on key resources in the Plan Area may change over time (for example, as the campus and University Community grow closer to conservation lands, or new invasive plant species arrive in the region).

This Plan outlines the key elements of the monitoring program for UCM Conservation Lands. To ensure consistency and efficiency, the specific monitoring protocols will be developed following approval of this Plan. This detailed monitoring protocol will be prepared as a separate Plan Element and appended to this Plan.

7.1.1 Baseline Monitoring

The purpose of baseline monitoring is to establish the resource conditions that will serve as the basis for evaluating the effectiveness of management activities set forth in the Plan. Baseline conditions for the UCM Conservation Lands will be based on previous inventories and analyses conducted for wetlands and special-status species. The metrics to be used in evaluating effectiveness will be chosen during development of detailed monitoring protocols. The management and monitoring commitments outlined in the Plan will determine the scope and focus of monitoring efforts. Accordingly, the baseline monitoring component of the Plan consists of identifying (1) the key program metrics to monitor for compliance, and (2) the resource conditions at specific monitoring sites that will serve as a basis of comparison for effectiveness monitoring.

7.1.2 Compliance Monitoring

Compliance monitoring can be divided into three basic types based on the frequency and regularity of the actions that it monitors: annual activities (performed at least once each year); regular periodic actions (performed at regular intervals, e.g., every 5 years), and irregular actions (actions conducted in response to conditions that do not occur on a predictable basis). Irregular management actions are those that are required only under certain conditions. Many of these are one-time actions conducted at the onset of Plan implementation, or they are triggered by irregularly occurring phenomenon such as treatment of detected invasive plants, active suppression of wildfire, construction of habitat improvements (e.g., kit fox dens), and maintenance of stock ponds.

Compliance with the Plan's management and monitoring requirements will be documented by completing an annual reporting checklist that verifies and reports on management activities that were undertaken, as well as those not undertaken. The checklist identifies all prescribed management, maintenance, and monitoring actions that are to be conducted on an annual, regular periodic, or irregular basis. A draft of the Annual Management Plan Compliance Checklist, Schedule, and Reporting Form (Annual Reporting Checklist) is included as Appendix D.

The monitoring checklist will serve several purposes. It will serve as a concise summary list of required management actions for the SNRI land manager. Also, annual completion of the checklist will document completion of required management actions for reporting to the UCM Environmental Affairs Director and to regulatory agencies. Finally, the checklist will provide a place for the land manager to identify any issues with any of the management requirements in the Plan that may require modification through adaptive management.

Compliance monitoring for the Plan will include the items listed below.

- Annual completion and submission of the Annual Reporting Checklist

- Verifiable on-the-ground evidence of management actions.
- Adaptive changes to the Plan as recommended in the monitoring checklist.

7.1.3 Effectiveness Monitoring

Effectiveness monitoring will evaluate how well the Plan performs in meeting its ultimate goals—or, in other words, in achieving the desired conditions on the ground. Effectiveness monitoring is centered on evaluating the conditions of physical, natural, and cultural resources (e.g., soils, watersheds, wetlands, special-status plants and animals, archeological and historical sites, and visual quality). Monitoring will be carefully designed and implemented to evaluate the effectiveness of specific management actions.

Effectiveness monitoring requires specific monitoring protocols. These protocols will be developed under the leadership of the SNRI to be consistent with the direction provided here, following approval of the Plan. Key management actions and resource conditions to be monitored are presented in Table 7-1. Individual monitoring protocols will be developed to address individual resources and management actions, but these protocols will share the basic framework summarized below.

- Monitoring goals and objectives.
- Locations.
- Monitoring methods.
- Analysis and reporting.
- Success criteria.
- Recommendations for future management and monitoring.

7.1.4 Data Management and Reporting

Monitoring protocols and results will be maintained by the SNRI land manager in an organized and accessible fashion (e.g., GIS files) to facilitate their ongoing use in managing lands and conservation resources. The land manager will prepare an annual report describing the monitoring that was conducted and summarizing results for distribution to the resource agencies, the easement holder, and general public. The annual report will specifically address the effectiveness of management actions implemented under the Plan, as well as remedial measures or modified management measures (see Chapter 8, *Adaptive Management*). Occurrences of special-status species, especially new species and locations, will be provided regularly to the California Natural Diversity Database. UCM also will host periodic meetings with regulatory agencies and other interested parties to evaluate plan effectiveness and discuss adaptive management responses.

7.2 CST Conservation Lands

The CST easement holder will conduct annual monitoring of compliance with the terms of the easements and the effectiveness of management actions taken. Annual monitoring efforts will focus mostly on compliance. Beyond simple compliance, the easement holder should focus monitoring on several conditions that may determine conservation values. Key resources for monitoring are listed below.

- Presence and extent of noxious weeds and potential threats they pose to species of conservation priority.
- Presence of non-native reptiles, amphibians, and fish in water bodies.

If monitoring of CST Conservation Lands identifies noncompliance with easement terms that is likely or is demonstrated to cause detrimental effects on species of conservation concern, the easement holder should, in a timely manner, proceed to work directly with landowners or take other actions as required to achieve compliance.

The CST easement should specify that annual compliance reports, based on monitoring conducted by the easement holder, be prepared annually and submitted to USFWS, DFG, and UCM.

Table 7-1. Effectiveness Monitoring Requirements for UCM Conservation Lands

Management Program	Activity	Frequency	Notes
Grazing	Evaluate RDM levels under various weather conditions to assess appropriateness of stocking rates	Annually	Conduct visual checks using photo points, calibrated with clipping plots
	If wetlands occupied by San Joaquin Orcutt grass and Colusa grass are grazed, evaluate grazing effects on seed production and subsequent year's growth	Per incident, if grazing occurs in occupied habitat	May be discontinued once effects are understood
	Monitor relationships between soil disturbance and noxious weed occurrence in high livestock use areas to evaluate whether moving high use areas reduces or increases incidence of noxious weeds	Report as meaningful information becomes available	Monitor using visual inspection of marted transects, photo-points, and visual inspection
Fire Protection and Management	Maintain records of fire occurrence (location, acreage) sufficient to evaluate changes in fire frequency	Per incident	Maintain in GIS
	Monitor firebreaks for noxious weeds	Annually	
	Evaluate effectiveness of non-ground-disturbing techniques to control wildfire	Per incident and generally	"Monitoring" based on reporting from Incident Commanders, experience of CDF fire personnel
	Monitor fire restoration efforts	Per incident	Monitor burned sites for invasion by noxious weeds, using visual evaluation and subsequent quantitative sampling of detected invasions
Integrated Pest Management	Conduct regular monitoring for noxious and invasive weeds, with intensive follow up surveys and quantitative monitoring if new weeds are detected. Monitor at higher intensity at critical control points including the Campus edge; fuelbreaks; lands adjacent to Paloma Road, Yosemite Lake Park, and canals; supplemental feed use and storage areas; and recent fires.	Semi-annually	
	Routinely monitor water bodies with known or potential use by the California tiger salamander to detect nonnative fish, amphibians, and reptiles.	Annually	
	Monitor effectiveness of specific non-native species control operations	Per incident; duration determined by individual plan	

Table 7-1. Continued

Management Program	Activity	Frequency	Notes
Research and Educational Uses	Monitor each permitted research and educational use to evaluate any effects on ecosystems (noxious weed introduction, soil disturbance and erosion, etc.).	Annually during and immediately following permitted use periods	
Habitat Enhancement and Management	Monitor artificial dens for use by kit foxes	Annually for 10 years	
	Maintain a sightings record database for observations of kit foxes and potential competitors and other species of conservation concern that may not be monitored systematically (i.e., burrowing owl, Swainson's hawk, mountain plover).	Continuously; summarized annually	
	Monitor populations of species of conservation concern including special-status plants, invertebrates, and California tiger salamander.	Annually	Develop a comprehensive monitoring protocol sufficient to detect long term population trends (i.e., >5 years)
Recreation and Other Public Uses	Monitor each permitted recreational use to evaluate any effects on ecosystems (noxious weed introduction, soil disturbance and erosion, etc.).	Annually during and immediately following permitted use periods	Focused on key used areas
	Monitor and report on any resource damage at any sites where unauthorized use is reported that results in disturbance of soil or vegetation.	Per incident	
Cultural Resources	Conduct archeological record and site surveys for any site that is proposed for >100 ft^2 ground disturbance	Per incident	
	Monitor for disturbance of archeological and historical sites during routine patrol	Weekly-monthly basis	

Chapter 8
Adaptive Management

8.1 UCM Conservation Lands

8.1.1 Rationale

The management outlined in this Plan represents UCM's best efforts to define management actions that will achieve the conservation purposes of the UCM Conservation Lands as reviewed and approved by the regulatory agencies. Nonetheless, the proposed management program is a first approximation based on available information from past management history in the Plan Area and the experiences of all parties in managing other similar lands. The parties, however, acknowledge that they cannot have foreseen all future management conditions and responses. Consequently, the Plan has adopted an adaptive strategy to refine the management program over the life of the Plan.

Adaptive management entails incorporating the results of empirical research and monitoring of previous management activities into future management activities. The information used to adapt management practices for the Plan may include results of formal research, monitoring results, or general observations of the SNRI land managers. .

Adaptive changes to management may be warranted for a variety of reasons, such as errors in assumptions regarding effects and efficacy of management practices or changes in environmental conditions (e.g., adjacent campus development, arrival of new invasive species).

While this plan emphasizes monitoring of management programs, active research on key issues also is an important component of a long-term conservation of UCM Conservation Lands. The presence of the University and its environmental research focus provides an ideal means to incorporate research into long-term adaptive management efforts.

8.1.2 Process for Adjusting Management Programs

Adaptive changes to management of Conservation Lands may be accomplished in several different ways, depending of the level of management change. As described below, minor changes may occur on an ongoing basis with appropriate documentation, while more major changes may be proposed for plan modification as they are documented or in regularly scheduled plan reviews.

Minor changes to the management measures for UCM Conservation Lands may be made without Plan amendment if they fall within the description of the direction provided in the Plan (and thereby meet the underlying environmental commitments and permit requirements). Minor changes can be made through simple mechanisms (e.g., errata sheets, letters of concurrence).

Necessary management changes that are inconsistent with the Plan's direction (but necessary in order to be consistent with the regulatory requirements of the BO and other environmental permits and requirements) will require a Plan amendment. Plan amendments may be initiated on an as-needed basis or through a regular 5-year plan review process.

Plan amendments should be formally proposed, reviewed, and approved as described below. In the unlikely event that necessary changes to the Plan would conflict with regulatory requirements, the Plan amendments would also require amendments to regulatory documents.

Proposed changes in Plan direction will be identified in the Annual Monitoring Report (see Chapter 6) to promote coordination with regulatory agencies and the easement holder.

Changes to the Plan will generally require the concurrence or approval of the regulatory agencies (USFWS and DFG) and the easement holder. Changes would not require approval in those limited circumstances when UC Merced determines that the change has no potential to affect conservation values.

Proposed Plan amendments will be distributed to the regulatory agencies, with a clear depiction of the language of the proposed changes, rationale for the change, and description of the expected outcome (e.g., effects on conditions of Plan Area resources). The regulatory agencies and easement holder will provide responses to the proposed amendment, and the parties will work cooperatively until consensus is reached.

Individual amendments can take the form of letters of agreement describing specific language changes. These accumulated amendments can be incorporated into Plan revisions over time as needed to facilitate Plan use for daily management.

8.1.3 Key Adaptive Management Topics

Key topics for application of monitoring to conduct adaptive management are encompassed in this plan (see Chapters 5 and 7) and in the Conservation Strategy (Jones & Stokes 2008: Chapter 8). Adaptive management of Conservation Lands inherently includes the future development and regular updating of a list of research priorities, along with pursuit of research funding, and coordination of approved research and management activities.

Some major areas of research to support adaptive management include the following.

- Evaluation of population sizes and genetic structure of species populations within Conservation Lands and among these populations and others elsewhere to determine species viability, effectiveness of existing conservation efforts, and priorities for future conservation actions.
- Specific habitat requirements of key conservation species, including relationships between geological formations and the rare or specialized vernal pool ecosystems in the project region within the eastern Merced County.
- Experimentally-based evaluation of responses to grazing management and other habitat management actions.
- Evaluations of interactions among invasive species and conservation species.
- Predicted responses of habitats and species populations to human-induced effects of light, noise, air quality, and climate change.

8.2 CST Conservation Lands

If monitoring identifies threats or suboptimal conditions for species of conservation concern that are occurring despite compliance with the terms of the CST conservation easement, the easement administrator should document a need for management changes in annual monitoring reports, and should propose modifications to management that are consistent with their authority under the conservation easements. These recommendations should be brought to the permitting agencies and UCM for consideration. Incorporation of new terms into the conservation easement would require landowner consent and possible compensation.

Under the likely future terms of the easement, the CST easement holder may conduct several management actions that are not requirements of landowners, such as use of controlled burning, pesticides, or other means to control noxious weeds (if grazing is found to be ineffective); and fencing of riparian habitats. These actions may benefit landowners, and thus may be performed by them or undertaken cooperatively with the easement holder. However, the easement holder is responsible for planning, funding, coordinating with landowners, and

implementing activities that are not required of landowners under the terms of the conservation easement.

If management needs for the CST Easement Lands are identified that are not within the legal authority of the conservation easement, the easement holder should attempt to work cooperatively with the landowners to determine if they are willing to make changes voluntarily.

If important management changes are needed that fall outside the authority of the conservation easement and will not be conducted voluntarily by the landowner, the easement holder will inform UC Merced and the permitting agencies of the need. These needs could be addressed through amendments to the conservation easement.

Chapter 9
Plan Implementation Schedule and Funding

This chapter presents an overview of the schedule and funding for implementing the plan. More specific information on specific funding sources and amounts to be used in implementing management is in development.

9.1 UCM Conservation Lands

This chapter presents a schedule and funding overview for implementing the management and monitoring actions described in Chapters 5 and 6. Accurate estimates of costs and a secure source of funding for management activities, monitoring, and reporting are essential for success of the Plan. The estimate of funding costs and sources will be revised following further discussion with the agencies, and following completion of the more detailed protocols for effectiveness monitoring discussed in Chapter 6.

The schedule for implementing the Plan is presented in Appendix D. This schedule separately lists initial Plan actions, annual activities, and periodic activities. This schedule serves as the basis for estimating funding needs for monitoring and management, as well as for reporting on compliance and effectiveness monitoring results (Chapter 6).

UCM is currently in discussions with USFWS, CDFG, and TNC concerning the appropriate funding structure to ensure that the management and monitoring is securely funded.

A preliminary schedule for implementing Plan actions is presented in the Management Plan Compliance Checklist (Appendix D). Implementation of activities will be initiated within 1 year of project approval.

9.2 CST Conservation Lands

Funding for the annual administration of the conservation easement on CST Conservation Lands will be provided from an endowment. The amount of the endowment will be determined on the basis of the specific terms of the easement and any monitoring and reporting plans developed to administer the easement.

Chapter 10
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Appendix A

Management Plan for Tier 2 Conservation Lands

Appendix A

Management Plan for Tier 2 Conservation Lands for the UC Merced Project

This appendix addresses management of lands on five properties that are not owned by the University of California (UC), but for which the Wildlife Conservation Board acquired conservation easements from private landowners ("landowners") as mitigation for construction of the University of California, Merced (UCM). These lands are referred to as Tier 2 Conservation Lands because they permit less adaptive management than the Tier 1 Lands owned and managed either by UCM (UCM Conservation Lands) or The Nature Conservancy (TNC) (i.e., the Cyril Smith Trust [CST] property). The Tier 2 Lands are addressed separately from Tier 1 Lands because of the lower level of authority by the agencies or easement holders to direct and control management actions.

This plan summarizes the easement holders' management responsibilities for Tier 2 Lands and responsibilities of the permitting agencies and UCM.

WCB conveyed conservation easements on the five Tier 2 properties to TNC or the California Rangeland Trust (CRT). The Tier 2 Lands were selected for conservation on the basis of their substantial conservation values (Vollmar 2002); accordingly, the easements were intended largely to maintain existing management practices, which are considered highly compatible with conservation purposes (Jones & Stokes 2002, ICF Jones & Stokes 2008; Marty pers. comm.).

Lands Description

Tier 2 Conservation Lands are located north and southeast of the campus and UCM Conservation Lands (see Figure 2-1 in the Management Plan for Conservation Lands (Airola 2008) within a large area of intact grassland and seasonal wetland habitat that has been identified as high-priority conservation areas in the Conservation Strategy (ICF Jones & Stokes 2008).

The Tier 2 Lands encompass a total of 17,239 acres. Table A-1 summarizes the known occurrences of biological resources with conservation priority at the various properties. Several documents provide more detailed information on the biological and wetland resources that occur on Tier 2 Lands, including reports by Vollmar (2002); EIP Associates (2002); Jones & Stokes (2002a, 2002b); U.S.

Fish and Wildlife Service (2002); Vollmar Consulting (2008), and ICF Jones & Stokes (2008).

Table A-1. Summary of Key Information on Tier 2 Conservation Lands for the UC Merced Project

Property	Ownership Status	Conservation Values	Total Acreage	Easement Holder
Robinson	Privately owned with a conservation easement conveyed October 2001	Vernal pool fairy shrimp, midvalley fairy shrimp, California tiger salamander; suitable San Joaquin kit fox habitat	3,595	The Nature Conservancy
Chance	Privately owned with a conservation easement conveyed June 2002	Vernal pool fairy shrimp, California clam shrimp, California fairy shrimp, California tiger salamander, succulent owl's-clover, and Ewan's larkspur; suitable San Joaquin kit fox habitat.	7,619	The Nature Conservancy
Nelson	Privately owned with a conservation easement conveyed May 2002	Vernal pool fairy shrimp, midvalley fairy shrimp, vernal pool tadpole shrimp, western spadefoot, western pond turtle, western burrowing owl, California tiger salamander, succulent owl's-clover, Hoover's calycadenia, and other endangered or rare species; suitable San Joaquin kit fox habitat.	3,861	California Rangeland Trust
Carlson	Privately owned with a conservation easement conveyed February 2002	Vernal pool fairy shrimp, California clam shrimp, California fairy shrimp, midvalley fairy shrimp, California tiger salamander, succulent owl's-clover, and spiny-sepaled button-celery; suitable San Joaquin kit fox habitat.	305	California Rangeland Trust
Cunningham	Privately owned by rancher with a conservation easement conveyed February 2002	Vernal pool and midvalley fairy shrimp and other rare vernal pool branchiopods, California tiger salamander, succulent owl's-clover, and several other rare, threatened, and endangered plant species; suitable San Joaquin kit fox habitat.	1,761	California Rangeland Trust
Total			**17,141**	

Protections Incorporated into Conservation Easements

Conservation easements for Tier 2 Conservation Lands have been conveyed to TNC and CRT. Easement terms were summarized in the *UC Merced Resource Mitigation Plan* (RMP) (Jones & Stokes 2002). The easements for the various properties are similar in form, with minor differences.

This section summarizes easement requirements. The five individual easements are provided in Appendix G of the *Management Plan for Conservation Lands and the Campus Buildout Site for the University of California Merced* (ICF Jones & Stokes 2008).

The basic terms of the easements require that the landowner preserve and maintain the conservation values of lands through compatible livestock grazing and other management. The easements restrict property uses and grant the easement holders a perpetual right to preserve, protect, identify, monitor, enhance, and restore the conservation values. The landowners retain the right to pursue a variety of land uses and exercise other rights, as long as they maintain the conservation values of the land. These permitted uses are listed below.

- Livestock grazing, subject to the following requirements.
  - Prevent increase in noxious weeds.
  - Retain required amounts of residual dry matter (RDM) in pounds per acre at the end of the growing season (See Table A-2 for RDM requirements on Tier 2 properties).
  - Locate food supplements (e.g., salt and mineral licks, food supplements, supplemental feed) away from vernal pools.
- Prescribed burning.
- Use of herbicides (only to control nonnative noxious weeds).
- Occupancy of existing residential dwellings.
- Ability to plant and maintain gardens and raise other farm animals and pets that are confined to residential areas.
- Hunting and fishing (with restrictions on fish stocking).
- Water source development and maintenance for livestock and wildlife use.
- Passive recreation.

Table A-2. Minimum RDM Requirements for Conservation Easement Lands

Tier 2 Property	RDM Requirement (lbs/acre)
Carlson	800 (400 in drought years)
Chance	600 (400 in drought years)
Cunningham	800 (400 in drought years)
Nelson	600 (400 in drought years)
Robinson	600

Prohibited uses are listed below.

- Land subdivision.
- Transfer of development rights.
- Non-ranching commercial uses, including development of natural resources (minerals, aggregate, energy).
- Disposal of hazardous waste, refuse, etc.
- Junkyards.
- Long-term leasing.
- Alteration of water courses, degradation of water quality, or impairment of water rights.
- Off-road vehicle use, except for use in ranching operations.
- Introduction of plant and animal species.
- Plowing, disking, land leveling, irrigation, or other alterations, except disking for fire control.
- Conversion to crops, orchards, or vineyards.
- Destruction of native vegetation (except by grazing or burning).
- Harvesting timber.

As the easement holders, TNC and CRT are granted the rights listed below.

- Reserve, protect, identify, monitor, enhance, and restore in perpetuity the conservation values of the land.
- Conduct evaluations of wetland quantity and quality, evaluate habitat quantity and quality, survey for threatened and endangered species, and monitor their populations.
- Access the lands to conduct monitoring activities, assess compliance, and take all actions necessary to achieve the terms of the easement.
- Install and maintain signage.
- Employ controlled burning, pesticides, or other means to control noxious weeds (if grazing is found to be ineffective).
- Fence riparian habitats.

Management Program Direction

The management program for Tier 2 Conservation Lands is consistent with the overall mitigation approach employed for these lands: to acquire and protect lands with high resource values and maintain the long-term management activities that have created and sustained these values. Because available

management options are constrained by the conservation easements, the management program emphasizes monitoring to enforce the terms of the easements. If monitoring identifies issues regarding easement compliance and resulting resource conditions, a limited amount of active management is authorized.

Easement Administration

TNC and CRT will conduct variety of routine tasks to administer easements. These activities are listed below.

- Annually remind the owners of Tier 2 Lands of easement responsibilities and identify the TNC and CRT easement administrators.
- In the event of land sale, ensure that future landowners understand easement requirements.
- Coordinate monitoring visits to easement properties.
- Provide results of monitoring efforts to landowners.
- Coordinate with landowners to adjust their management in accordance with the terms of the easement.

Beyond strict legalistic administration of the easement, it is important that TNC and CRT easement administrators maintain cooperative, goodwill relationships with Tier 2 landowners to facilitate beneficial resource management.

Monitoring and Reporting

TNC and CRT will conduct annual monitoring and document monitoring results for compliance with the terms of the easements and the effectiveness of management actions taken. Monitoring will focus mostly on compliance, to document whether the landowner is adhering to the easement terms. Beyond simple compliance, easement holders should focus monitoring on several conditions that may determine conservation values. The key resources upon which monitoring should focus are listed below.

- Presence of and extent of noxious weeds and potential threats they pose to species of conservation priority.
- Presence of nonnative reptiles and amphibians in water bodies.

If monitoring of Tier 2 Conservation Lands identifies noncompliance with easement terms that is likely or is demonstrated to cause detrimental effects on species of conservation concern, TNC and CRT *should work directly with landowners or take other actions as necessary to achieve compliance*.

Adaptive Management

Opportunities to conduct adaptive management on Tier 2 Conservation Lands are limited, because the landowner is required only to comply with terms of the easement. Nonetheless, several opportunities are available to modify management on the basis of monitoring results.

If monitoring identifies that threats or suboptimal conditions for species of conservation concern are occurring under the terms of the easement, TNC/CRT easement administrators should document a need for management changes in annual monitoring reports and should propose management modifications that are consistent with their limited authority under the conservation easements.

Under the terms of the easements, TNC/CRT can conduct several management actions that are not requirements of landowners, such as use of controlled burning, pesticides, or other means to control noxious weeds (if grazing is found to be ineffective); and fencing of riparian habitats. As the easement holders, TNC and CRT would be responsible for planning, funding, coordinating with landowners, and implementing these activities.

If management needs are identified that are not within the legal authority of the conservation easement, TNC/CRT should attempt to work cooperatively with the landowners to determine if they are willing to make changes voluntarily.

Easement administration and monitoring are currently underway on Tier 2 Conservation Lands. Management of the easements is under the authority of the easement holder. A recommended annual schedule for activities is shown below.

Funding

TNC and CRT will be responsible for funding for the administration and monitoring of their easements and for conducting administration, monitoring, and adaptive management actions.

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Appendix B

Grazing Management Plan for UC Merced Conservation Lands

MANAGEMENT PLAN FOR CONSERVATION LANDS AND ADJACENT CAMPUS BUILDOUT LANDS FOR THE UNIVERSITY OF CALIFORNIA, MERCED

APPENDIX B

UCM CONSERVATION LANDS GRAZING MANAGEMENT PLAN

Submitted to:

University of California, Merced
Physical Planning, Design and Construction
P.O. Box 2039
Merced, California 95344
Contact: Brad Samuelson

and

Airola Environmental Consulting
2700 6th Avenue
Sacramento, California 95818
916/454-3073
Contact: Daniel Airola

Prepared by:
LSA Associates, Inc.
157 Park Place
Point Richmond, California 94801
510/236-6810

LSA Project No. AIE0701

LSA

August 8, 2008

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APPENDICES

1.0 INTRODUCTION

1.1 PURPOSE AND GOAL

This Grazing Management Plan (GMP) documents rangeland conditions and livestock use and provides a framework to direct future management activities for the Conservation Lands and Campus Buildout site for the University of California (UC), Merced. (See Appendix B-1 for definitions of "grazing management" and other range terms). Research and informed observations indicate that livestock grazing can be employed effectively to maintain vernal pool hydrology and ecosystem biodiversity and to preserve or enhance habitat conditions for special-status plants and animals associated with vernal pools (Barry 1996, Robins and Vollmar 2002, Marty 2004, Pyke and Marty 2004). Based on this knowledge, the Biological Opinion (BO) for the UC Merced Campus Project (USFWS 2002) required a management plan for conservation lands that specifies management policies and practices to conduct livestock grazing (among other activities) for habitat enhancement (see BO page 21). The goal of the GMP is to help fulfill that requirement for the Management Plan for Conservation Lands and the Future Campus Buildout for UC Merced (MPCL; Airola 2008).

1.2 METHODOLOGY AND INFORMATION SOURCES

Plan author, Richard Nichols is licensed by the State Board of Forestry as Certified Rangeland Manager #45. Mr. Nichols conducted a literature review of pertinent information (see Literature Cited). He conducted interviews with grazing lessees of the Conservation Lands and the adjacent Cyril Smith Trust (CST) owned by The Nature Conservancy (see Personal Communications) regarding past livestock operations, recent actual livestock use, and range improvement conditions and needs. A site visit was conducted on May 7, 2007, to tour the grazing lands to observe on a reconnaissance level rangeland forage composition and productivity, grazing utilization and distribution, and the condition and location of range improvements.

A range analysis was conducted to determine preliminary livestock carrying capacity levels (see Appendix B-1 for definitions). Rangeland forage production estimates (pounds of dry matter per acre) were obtained from Ecological Site Descriptions (NRCS 1983, 1984) which are groupings of soil types with similar productivity levels. Ecological Sites were mapped and acreages calculated for the site after grouping applicable soil types from digitized maps of the Soil Survey of Merced County (Arkley 1962). An Excel spreadsheet was then used to calculate carrying capacity based on total forage production for each Ecological Site and accounting for a target residual dry matter level of 800 pounds per acre and consumption of 1,000 pounds of dry matter per animal unit month which includes allowances for wastage, trampling and wildlife use (Table C).

2.0 SETTING

The physical and biological setting is described here briefly to provide a framework for understanding this plan as a stand alone document. This setting discussion is summarized from much more extensive discussions provided in the UC Merced Conservation Strategy (Jones & Stokes 2007), and the project BO (USFWS 2002) and other supporting documents, as described in the MPCL.

2.1 LOCATION AND CONFIGURATION OF MANAGEMENT AREAS

The Conservation Lands are located to the north, northeast, and east of the proposed UC Merced Campus and Yosemite Lake and east of the CST, approximately 5 miles northeast of the City of Merced (Figure B-1). They consist of the Virginia Smith Trust (VST) Preserve, the Campus Natural Reserve (CNR) and the Myers Easterly property. The lands currently under grazing lease proposed for ongoing future development of the campus ("Campus Buildout") (Figure B-2) are covered temporarily under this plan because grazing use is desirable there prior to development. Only the portion of the Campus Buildout that is fenced (cross-hatched in Figure B-2) is currently leased for grazing. For purposes of this plan, the VST Preserve, CNR, Myers Easterly and grazed portion of the Campus Buildout will constitute the UC Merced Grazing Management unit. The remainder of the Campus Buildout (not cross-hatched in Figure B-2) is not grazed and vegetation there is managed by other techniques.

The VST Preserve is owned and managed by UC Merced with a conservation easement granted to The Nature Conservancy. The Myers Easterly property is owned by the University Community Land Company (UCLC), owned by UC and The VST. A Conservation Easement has been granted to TNC. The CNR and Campus Buildout are owned and managed by UC Merced but are not under a conservation easement. The UC Merced Grazing Management Unit is leased to the Fagundes Brothers Dairy except for the Myers Easterly property which is separately leased. When development of the Campus Buildout commences, it will no longer be grazed and will not be covered under this GMP.

2.2 TOPOGRAPHY, GEOLOGY, SOILS

The project area is typical of the gently undulating topography of the eastern San Joaquin Valley which consists of broad alluvial fans, stream and river deposits, and different types of volcanic and sedimentary bedrock. Elevations in the study area range from approximately 280 feet in the CNR on the east shore of Yosemite Lake to 568 feet in the northern portion of the VST Preserve. An important feature of the study area is the "mima mound" micro-topography with low-lying basins that pond in the rainy season and evaporate by the summer (forming vernal pools) and intervening upland mounds (Vollmar 2002).

The geology of the study area varies by age, generally with the oldest surfaces to the west and youngest to the east (Vollmar 2002). The Mehrten formation to the west consists of redeposited

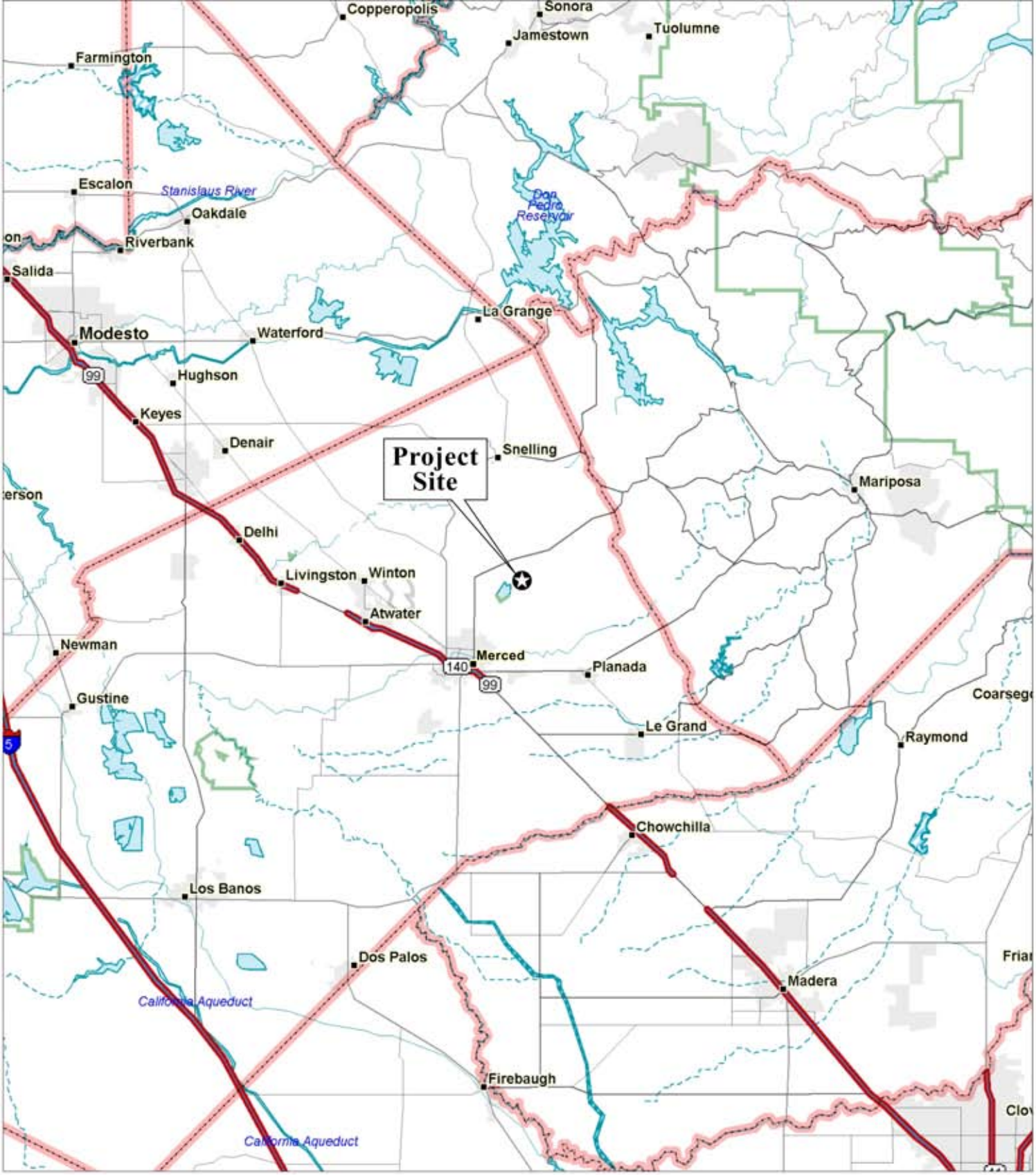

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FIGURE B-1

University of California, Merced
Conservation Lands Grazing Management Plan

Regional Location

N

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MILES

SOURCE: ©2002 DeLORME. STREET ATLAS USA®2003.

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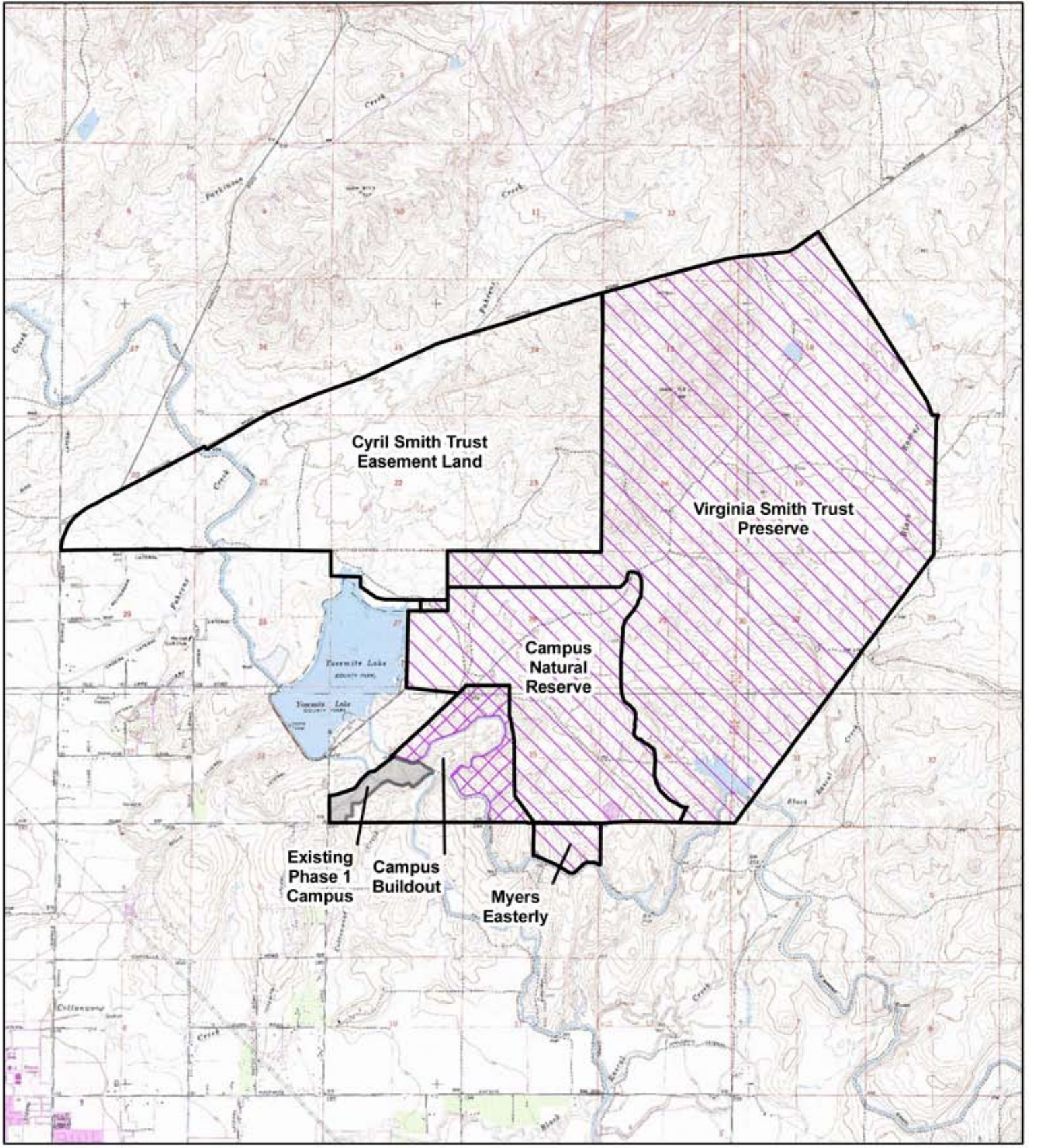

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UC Merced Conservation Lands Unit

Campus Buildout Lands
Incorporated into Grazing Plan

Parcels (approximate)

Existing UC Merced Campus Development

0 0.5 1
MILES

FIGURE B-2

University of California Merced
Conservation Lands
Grazing Management Plan

Project Area

SOURCE: Jones and Stokes (2007); LSA (2007); USGS 7.5-minute Topo Quads - Yosemite Lake, Haystack Mtn, Merced, and Planada.

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alluvium from volcanic mudflows and ashflows resulting from volcanic eruptions in the Sierra Nevada from 10 to 25 million years ago. This geologic substrate developed into three soil types (Pentz, Peters, Raynor) generally characterized by dark heavy clays. The Laguna Formation was formed from gravel/cobble alluvium deposited from granitic glacial outwash originating in the Sierra about 3 to 10 million years ago. The Laguna Formation is associated with Redding and Corning soils typified by acidic gravelly loams, often with a thick well developed hardpan layer. These soils have eroded into some of the most well developed mima mound and vernal pool topography in the region. Hopeton soils consists of clays and clay loams that occur between the lower levels of the Laguna formation and the upper levels of the Mehrten formation. The North Merced gravels consist of a thin layer of locally derived gravel deposited about 1 million years ago. Some of this formation has weathered into Redding soils with a substantial hardpan and dense vernal pool/mima mound topography. Recent Holocene alluvium consists of loam soils deposited in the last 10,000 years along lower floodplains of creeks. This formation in the study area consists of Bear Creek soils deposited along Fahrens Creek and Black Rascal Creek. Anderson gravelly soils are derived from recent alluvial deposition along Fahrens Creek.

The nature of the soils directly affects production of livestock forage (consisting primarily of annual grasses and forbs). Deeper soils with finer textures (clay or clay loam) tend to be more productive because they have a higher moisture holding capacity and deeper rooting depth than shallow soils with coarser textures (sandy, gravelly or cobbly loam). Accordingly, the USDA Natural Resources Conservation Service (NRCS 1983, 1984) has grouped soil types into Ecological Sites with similar productivity levels. Acreages and estimated total annual forage production (air dry weight) for unfavorable, average, and favorable rainfall years for each Ecological Site in the UC Merced Grazing Unit are provided in Table C. Acreages of the Grazing Unit are based on current configurations formed by existing fencelines. These will be adjusted in the future to account for development of the Campus Buildout.

The most extensive Ecological Site in the study area, covering over 5,000 acres, is the Claypan Terrace (Figure B-3) consisting of Corning, Keyes, Montpelier, and Redding soils. The Hopeton soil was also placed in the Claypan Terrace group by NRCS staff (J. Foster pers. com.) due to similar production levels. In the study area, the Claypan Terrace Ecological Site consists of shallow soils (due to a clay layer that restricts rooting depth) typically with gravelly loam surface textures.

The Clayey Ecological Site is less extensive in the study area, covering about 1,000 acres (Figure B-3) consisting of Peters and Raynor soils. This Ecological Site is typically on shallow soils of clay or cobbly clay.

The Shallow Rocky Loam Ecological site, covering about 330 acres in the study area (Figure B-3), consists of Pentz soils. This Ecological Site consists of very shallow soils underlain by bedrock typically with gravelly loam textures.

The Upland Swale Ecological Site, covering about 190 acres of the study area (Figure B-3), consists of Bear Creek soils along Fahey and Black Rascal creeks. These soils are deep with loamy textures.

A small area of Anderson gravelly soils occurs in the northeast corner of the site, covering only 11 acres (Figure B-3). This soil was not placed in an Ecological Site by the NRCS, but according to the Merced Area Soil Survey (Arkley 1962) it produces more forage than the Claypan Terrace and

Shallow Rocky Loam sites but less forage than the Upland Swale Site. For a conservative analysis it was placed in the Claypan Terrace Ecological Site, estimated to produce approximately 2500 pounds per acre in a normal rainfall year (Table C).

Areas that produce no forage include open water and barren terrace escarpments (Figure B-3). The acreages of these areas were excluded from the grazing analysis to determine appropriate grazing capacities and corresponding recommended stocking rates.

2.3 BIOLOGICAL RESOURCES

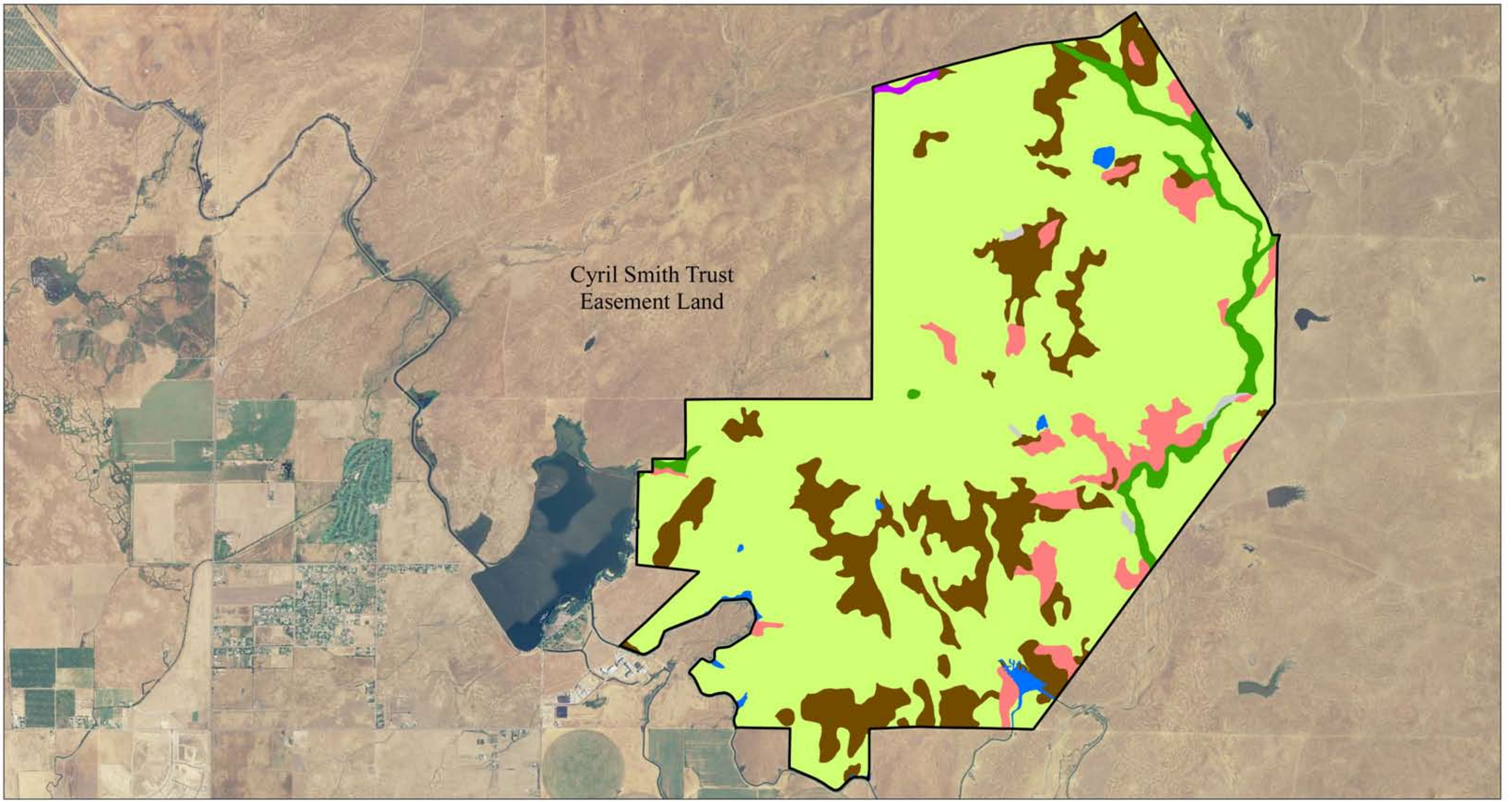
The biological resources of the study area have been extensively documented (USFWS 2002, Jones & Stokes 2007), so this brief summary focuses on issues most relevant to livestock grazing and conservation goals. Annual grasslands dominated by non-native grasses and forbs occupy the uplands of the study area and invade the vernal pools and swales under low grazing pressure. Annual grasses provide high quality and nutritious livestock forage when they are green during the rainy season, generally after late fall or winter (October-December). The grasses "cure" (dry) in the late spring or early summer (April-May), after which nutrition levels drop rapidly. Annual grasslands in the study area provide habitat for a wide variety of native reptiles, birds, and mammals. Many special-status species forage on small mammals in grazed grasslands in the study area including a variety of raptors (Sloat and Whisler 2002) and the federally endangered San Joaquin kit fox (Orloff 2002).

Native vernal pools and swales are seasonal wetlands that support a unique assemblage of native aquatic plants when they are inundated in the winter and display colorful native wildflowers as they dry in the spring. In the study area, they support three special-status plants and five special-status animals (four crustaceans and an amphibian) that are a focus of the MPCL and this GMP.

One of the special-status plants, succulent owl's clover, occurs in a wide range of vernal wetland habitats and is scattered throughout the plan area (Jones & Stokes 2007). This species benefits from habitat protection and moderate grazing to reduce competition with non-native annuals (Dittes and Guardino 2002).

Two of the special-status plants, Colusa grass and San Joaquin Valley Orcutt grass (both federal and State endangered species), have special habitat requirements because they occur only in large or deep vernal pools and stock ponds that are inundated for a longer period than most pools (Dittes and Guardino 2002). Occurrences in the study area are located in several large or deep natural pools and three stockponds (Figure B-4 derived from CDFG 2007). Although these species have survived in areas managed historically and recently for livestock grazing, certain grazing regimes are recognized as potential threats to these species (Dittes and Guardino 2002). Specifically, late spring and summer grazing may be detrimental to Orcutt and Colusa grasses because they are vulnerable to trampling during their terrestrial flowering and fruiting stages.

Observations by The Nature Conservancy staff in the Vina Plains Preserve in the upper Sacramento Valley indicated that trampling by cattle after vernal pools began drying (after May 15) adversely affected Orcutt grass populations (as reported in Robins and Vollmar 2002). These Orcutt grass populations recovered after a change in management strategy that required cattle to be removed no later than May 1st. It should be noted that no impacts from grazing on these Orcutt grasses have been observed on the UC Merced Conservation Lands and it may not be an issue. Moderate grazing earlier



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FEET

Soils Grouped by Ecological Site Class

- Clayey
- Claypan Terrace
- Shallow Rocky Loam
- Upland Swale
- Anderson Gravelly Soils
- None (Barren)
- Water

UC Merced Conservation Lands Unit

FIGURE B-3

University of California Merced
Conservation Lands
Grazing Management Plan

Soils

SOURCE: Merced Area Soil Survey (NRCS); Aerial Imagery from USDA NAIP (2005)

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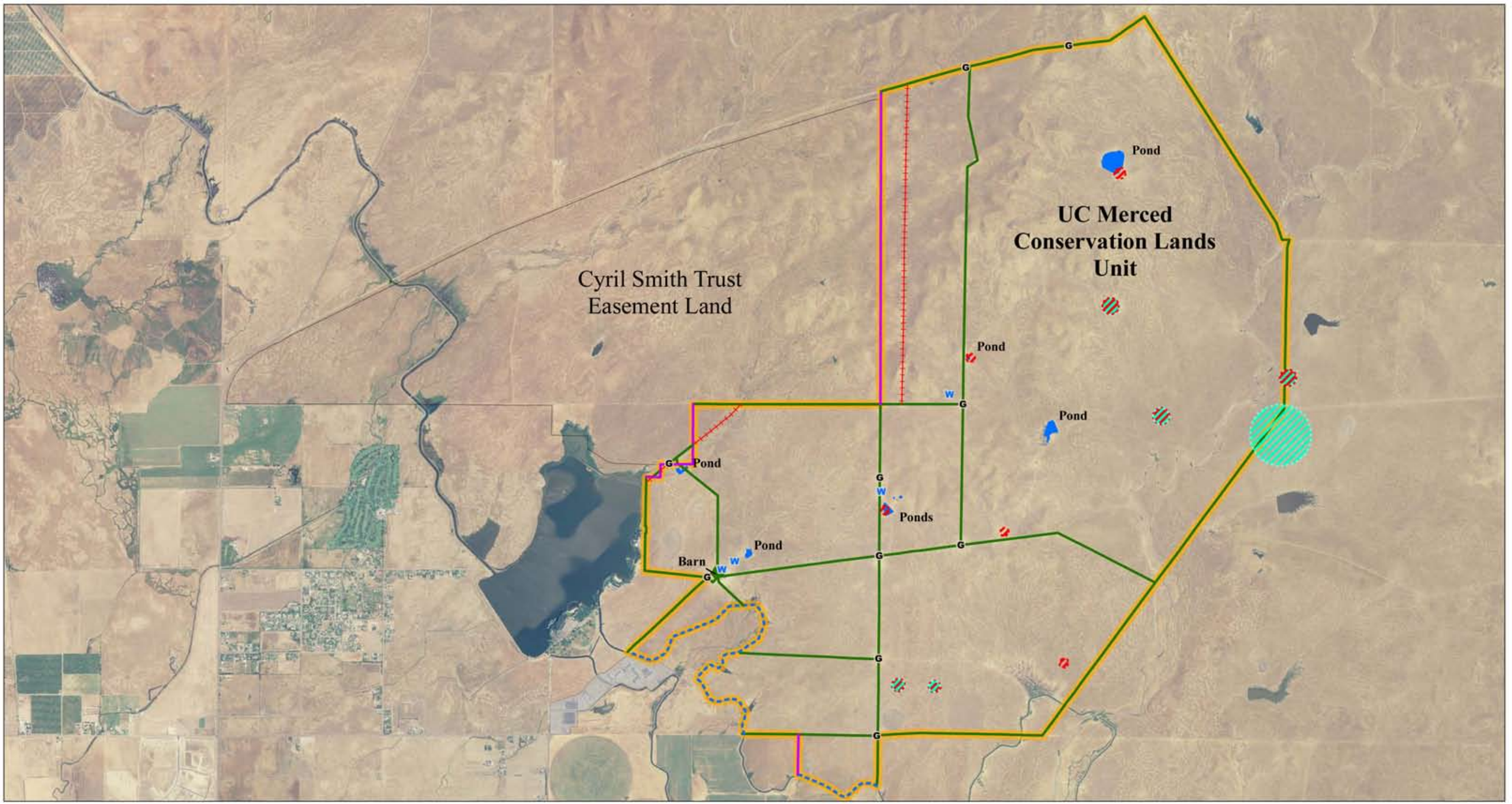

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0 1,500 3,000
FEET

- Existing Fence
- Proposed Fence
- Pasture Boundary (canal)
- Existing Fence - to be removed
- UC Merced Conservation Lands Unit
- Stock Pond
- W Water Trough
- G Gate
- Colusa Grass
- San Joaquin Valley Orcutt Grass

SOURCE: Aerial Imagery from USDA NAIP (2005); Special Status Plant Locations from CNDDB (CDFG 2008).
I:\AIE0701\GIS\Maps\FigureB-4_Range Improvements.mxd (08/05/2008)

FIGURE B-4

University of California Merced
Conservation Lands
Grazing Management Plan

Range Improvements and
Special-status Grass Occurrences

in the spring appears to be compatible because cattle do not concentrate on inundated pools when the juvenile Colusa and Orcutt grasses are in their aquatic stage. In addition, historic construction of stockponds for livestock grazing appears to have provided additional habitat for this species in the UC Merced Management Unit (Figure B-4). Continued future maintenance of ponds for livestock use also appears to be beneficial to these species.

Four special-status crustaceans that occur in the study are adapted to seasonally inundated habitats such as vernal pools (Jones & Stokes 2007:Figures 3-12 to 3-15). One of these, Conservancy fairy shrimp, is found in only one pool on the CST. The vernal pool tadpole shrimp is limited in the vicinity to a portion of the CST. Two species, the midvalley fairy shrimp and the vernal pool fairy shrimp, are more ubiquitous and scattered throughout the study area. Preserving habitat for vernal pool crustaceans is apparently compatible with livestock grazing because they have survived throughout a long history of ranching operations. Recent research in eastern Sacramento County indicates that moderate season-long (October-June) livestock grazing is beneficial for vernal pool invertebrates and vertebrates because it maintains the length of inundation in vernal pools. Taxa richness of invertebrates and vertebrates in pools where grazing was eliminated decreased significantly (Marty 2004).

Breeding habitat for the federally-threatened California tiger salamander (CTS), occurs in scattered vernal pools and stock ponds throughout the study area (Jones and Stokes 2007:Figure 3-16). Some researchers have speculated that excessive use by cattle could negatively affect this species by trampling of juveniles in the pools and adults migrating through grasslands (as reported in Robins and Vollmar 2002). Others have expressed concerns that light grazing pressure could lead to a build up of thatch around pool margins and in uplands that would impede overland migration of juveniles and adults *(*as reported in Robins and Vollmar 2002). Marty's (2004) research indicates that decreased hydroperiods in ungrazed and short-term, seasonally grazed pools may not be adequate in length to support breeding salamander populations. Stock ponds constructed and maintained for livestock grazing provide highly suitable breeding habitat for CTS (Bobzien and DiDonato 2007). Several stock ponds in the UC Merced grazing unit support CTS breeding habitat (CDFG 2007). Although more research is needed to clarify the relationship of CTS and livestock grazing, it is clear that CTS are at least tolerant of grazing because they have survived under a long-term regime of moderate season-long cattle grazing.

3.0 LAND USE

3.1 HISTORIC GRAZING USE

The vernal pool landscape of eastern Merced County and associated plant and animal species evolved and persisted with intense grazing pressure. Grasslands, dominated by perennial bunchgrasses, throughout California were grazed by large herds of megafauna in the late Pleistocene (300,000 to 10,000 years ago) including now extinct species of mammoth, mastodon, giant sloth, tapir, llama, horse, pronghorn, camel and bison (Edwards 1996). More recently, the explorer Jedediah Smith observed an abundance of tule elk, deer, and pronghorn antelope when traveling through the Merced region in 1827 (Outcalt 1925). Early settlers indicate that wild cattle and horses escaped from Spanish and Mexican era ranchos in the outer Coast Range and roamed in large numbers throughout the grasslands of Merced County. The History of Merced County (Outcalt 1925) states that wild horses were abundant during the Rancho period to the extent that tens of thousands were slaughtered between 1805 and 1810 to prevent the range from being overgrazed. It is likely that grazing use by wildlife and feral livestock in the study area during the historic period was generally confined to the winter and spring due to the low availability of permanent water sources in the summer and fall. Also during the historic period, native perennial grasslands throughout the Central Valley of California were converted to non-native annual grasslands. This vegetative type conversion resulted from accidental introduction and spread of vigorous Mediterranean annual grasses by European settlers and livestock, which replaced the native perennial grasses already weakened by prolonged overgrazing, other human disturbances, and extended drought (Heady 1988).

The livestock industry in Merced County grew exponentially after settlers imported bands of cattle and sheep into Merced County during the Gold Rush era to take advantage of the available range forage and the demand for meat. One of these settlers, J.M. Montgomery of Bear Creek (near the study area), was assessed for ownership of over 5,000 cattle and 1,700 sheep in 1854. During this period it was stated by a local cattleman that there were "…more cattle shipped within a radius of 25 miles from Merced than from any equal area in the world" (Outcalt 1925). The normal practice during this period, which persists today, was to run cattle and sheep on the eastern Merced County grasslands during the winter and early spring and drive them to meadows in the Sierra Nevada in the summer. According to the History of Merced County (Outcalt 1925), cattle were the basis of nearly all the fortunes acquired in the early settlement period.

In modern times, cattle grazing has become a marginal economic enterprise in the Central Valley due to elevated land prices and land use pressures. In addition, low beef prices and highly variable forage production due to rainfall extremes combine to make cattle ranching a borderline industry (Robins and Vollmar 2002). This is important to keep in mind for planning purposes to ensure that conservation grazing operations are conducted in a manner that contributes to economical viability.

The prevailing view is that historic grazing uses (i.e., seasonal patterns, intensities) have been compatible with the protection of conservation values for species of conservation interest in Eastern Merced County (Robins and Vollmer 2002, Dittes and Guardino 2002) and within the plan area (Jones & Stokes 2002, USFWS 2002; J. Marty, pers. comm.). The UC Merced Conservation lands are

considered to be in high quality condition, with minimal need and opportunity for enhancement or restoration.

3.2 RECENT LIVESTOCK USE

The UC Merced lands (about 6, 717 acres as currently configured with existing fence locations) have been leased since November 1, 2006, for three years with a three-year renewal option, to the Fagundes Brothers Dairy for a replacement heifer operation. Replacement heifers are placed as weanlings (i.e., at about 3 months of age) on the annual rangeland during the green growth period, typically in December or January, until they are removed in May or June. They are then sold or moved to irrigated pastures to be raised as cows for milk production. Approximately 1,500 replacement heifers averaging 600 pounds (the equivalent of yearlings at 0.75 animal units each) were run on the UC Merced lease (6,717 Acres) for about six months from December 2006 until removed in early June 2007 (R. Fagundes pers. com.). This stocking rate calculates to approximately 1.0 animal unit months (AUMs) per acre.

4.0 RANGE IMPROVEMENTS

Range improvements are the on-the-ground facilities required to conduct grazing operations. The current distribution and conditions of facilities influences livestock management options.

4.1 FENCES AND GATES

The UC Merced Management Unit is surrounded by five-strand barbed wire fences to prevent cattle from straying onto roads and adjacent properties. These fences were installed without surveys decades ago and have since been repaired and maintained in place. Therefore they do not always conform to property lines. This discrepancy is confirmed by comparison of the parcel boundaries (Figure B-2) with the actual fence locations determined from aerial photography and site visits (Figure B-4). Approximately 190 acres of UC Merced property is apparently fenced within the Cyril Smith Trust land and grazing leases have been adjusted to account for this variance in acreage. UC Merced is considering removing old fences that are not aligned with property boundaries while constructing new fences along the correct property lines. This would require removal of approximately 12, 840 linear feet of old fence and installation of approximately 13,825 linear feet of new fence (Figure B-4). Several informal gates along the perimeter fence allow for cattle to be released and removed from the grazing units and for access by vehicles and equipment.

The UC Merced grazing unit is divided into six pastures with internal five-strand barbed wire fences. Subdividing the grazing unit into pastures helps facilitate separation and movement of cattle. It also improves distribution of livestock within the pastures. Passage for cattle and vehicles between these pastures is facilitated through several informal gates (Figure B-4).

4.2 WATER SOURCES

Drinking water for livestock is supplied by troughs, stock ponds, irrigation canals. Three troughs on UC lands are filled with groundwater pumped from wells by windmills (Figure B-4). Seven stock ponds in the UC Merced Management Unit also supply drinking water on a seasonal basis. Cattle can also access water from flows in portions of Black Rascal Creek and from irrigation canal leakage in several locations of the southern pastures of the UC Merced unit (Figure B-4).

4.3 LIVESTOCK HANDLING FACILITIES

A barn is located within the Campus Buildout parcel (Figure B-4). It is not used by the current grazing lessee and will not need to be replaced if it is removed for campus expansion. If future lessees require livestock handling facilities, these could be provided using temporary corrals and chutes.

5.0 GRAZING MANAGEMENT PLAN

5.1 MANAGEMENT RESPONSIBILITIES

As described in the MPCL, the VST Preserve, CNR, and Campus Buildout are owned in fee title by UC (with conservation easements over VST Preserve granted to The Nature Conservancy). The Myers Easterly property will continue to be managed under a separate lease by the UCLC. The Sierra Nevada Research Institute (SNRI), in cooperation with the Campus Director of Environmental Affairs will have management responsibility over these UC Conservation lands. Therefore the following management activities for implementation of the GMP will be the responsibility of a UC Merced/SNRI designated Resource Manager who may assign them to the grazing tenants in accordance with lease terms:

- Maintain fencing, livestock water facilities, and signage.
- Coordinate and oversee trash removal.
- Coordinate and oversee thatch (residual dry matter-RDM) removal, invasive non-native plant species control, and native plant revegetation activities.
- Review biological/rangeland monitoring data.
- Maintain records of GMP activities, correspondence, and decisions.
- Conduct general inspections of the grazing units.
- Recommend and implement corrective actions to attain the goals of the GMP.
- Ensure compliance with rules and regulations protecting resource values and coordinate enforcement activities.
- Recommend and implement volunteer educational or habitat restoration programs.

5.2 MANAGEMENT GOALS

Grazing management within the UCM Conservation Lands will be based on defined biological goals, opportunities for management partnerships, and adaptive input from monitoring. Building partnerships with federal, state, local agencies, landowners, and non-governmental organizations will ensure long-term stewardship of the vernal pool ecosystem. General management goals are as follows:

- Protect and/or enhance the biological values of preserved vernal pools and associated grasslands.
- Protect and enhance special-status species habitat.
- Promote the growth and cover of native plants by preventing the introduction and establishment of invasive, non-native weeds.
- Remove/control existing invasive weed populations.

- Implement a program of long-term monitoring that will allow management techniques to continually improve.
- Manage grazing leases in a manner that contributes to the economic viability of livestock operations on the UC Merced lands.

5.3 RECOMMENDED GRAZING LEASE CRITERIA

The terms of grazing leases and the lessee selection process can substantially affect progress towards attainment of biodiversity goals. The lessee selection process and lease terms should favor a livestock operator who is motivated to help attain the plan goals and should provide incentives towards their attainment. The following criteria are recommended to develop a lease program that provides for those incentives:

- *The lessee selection process should be based on an appraisal method rather than an economic bid system*. Appraisal methods evaluate relevant criteria to select grazing tenants that are qualified and motivated to enhance vernal pool and grassland biodiversity values. Conversely, using a selection process that emphasizes bid value alone can encourage economic short cuts and improper grazing practices such as overstocking. Grazing tenant selection for new leases should be based on a proposal and interview process with a selection committee that includes the Resource Manager. Proposal evaluation criteria for selection of a grazing lessee should include:
  - accuracy and responsiveness of the proposal,
  - financial stability,
  - adjacency of existing grazing operations,
  - experience with invasive non-native weed control and revegetation activities,
  - ability to respond quickly to problems,, and
  - relevant experience with rangeland conservation practices.

  The proposal process may not be necessary if present grazing tenants on UC Merced property demonstrate effective and responsive records for conservation grazing practices and wish to renew their leases.
- *Leases should be awarded for long-terms (at least five years)*. Long-term leases provide grazing tenants with incentives to conduct maintenance and long-range management activities. Grazing history interviews for similar management plans in vernal pool ecosystems indicate that livestock operators will be more likely to overstock the range when they are uncertain about continuing operations in the following year (Witham 2006). Conversely, longer land tenure motivates the lessee to develop a sustainable operation conducive to attaining resource objectives. Of course, long-term leases should incorporate performance standards that allow early termination for noncompliance. Leases longer than five years must be approved by the easement holder on the VST Preserve.
- *Lease fee structures should be based on animal unit months (AUMs), not on acreage*. Because ecological sites vary significantly in forage production, the monetary value of a given area for grazing also varies. Grazing leases based purely on acreage are unfair and encourage overstocking. The lease fee structure should set stocking rates in AUMs and show how they are

calculated. The lessee should submit monthly use reports showing the number and class of livestock on the Conservation Lands which the can then be spot checked by the Resource Manager,

- *Grazing leases should provide incentives for lessees to participate in resource management activities*. The lease fee structure should provide a framework for the lessee to be compensated for labor and materials expended in installing or replacing range improvements and in conducting biodiversity enhancement activities such as weed control and native plant seeding under direction of the Resource Manager as appropriate. It should also define utilization levels using residual dry matter (RDM) levels as targets in pounds per acre.
- *The grazing leases should require that the lessees and management entity prepare an annual grazing plan (AGP) that is developed to incrementally attain the goals of the GMP*. The lessees should work with the Resource Manager to develop an AGP each year prior to introduction of livestock. The AGP should identify grazing schedules (including AUMs and pasture rotation schedules), RDM targets, range improvement installation and maintenance activities, invasive non-native plant control and native revegetation activities, and monitoring schedules.
- *The grazing leases should require that the lessee and Resource Manager document actual grazing use*. Records should be kept and documented each year in the AGP on the previous year's livestock use including animal types, numbers, and schedules.

5.4 MODIFICATIONS TO THE GMP

The grazing prescriptions outlined below may be modified by the Resource Manager in co-operation with the grazing lessee. Stocking rates will need to be adjusted periodically over the life of the plan as portions of the Campus Buildout are developed (see Section 5.5). Otherwise, however, the modifications should be minimal in order to avoid impacts to the biological resources on the property. The prescription may also be subject to change as a result of recent or future research or monitoring results and on-site adaptive management practices.

The grazing prescriptions recommended below are based on the use of cattle. If another type of livestock is used, the beginning and cut-off dates will be evaluated and potentially adjusted by the Resource Manager, in cooperation with the grazing lessees.

5.5 LIVESTOCK CARRYING CAPACITY/STOCKING RATES

A range analysis was conducted (Table C) to estimate forage production, livestock carrying capacity, and appropriate stocking rates. These are based on forage production estimates from ecological site descriptions (NRCS 1983, 1984) with a target RDM levels of 800 pounds per acre for consistency with resource management objectives and easement requirements. The acreages and resulting stocking rate recommendations are approximate and should be interpreted and applied with flexibility and adjusted based on monitoring results.

The stocking rates (i.e., number of grazing livestock per acre) calculated by this range analyses will be used as an approximate benchmark to establish initial stocking rates for average, favorable (wet) and unfavorable (dry) rainfall years. They can be achieved either by adjusting the grazing season (shorter for dry years) or the number of animals. These stocking rates will then be adjusted (up or

down) based upon flexible interpretation of annual monitoring results. The average stocking rates will be based on the number of pounds of forage available in each grazing unit in an average year. These base stocking rates are estimates subject to variability due to rainfall levels and other factors and will be revised in accordance with periodic monitoring throughout the grazing year. Estimates of forage production may be periodically calibrated during the grazing season based on grass heights and air-dried sample weights ("standing crop") collected periodically by the Resource Manager in ungrazed caged plots. The total available forage and resulting carrying capacity is partially based on acreage, which should be adjusted with gains or losses to the Grazing Units, such as when the Campus Buildout lands are developed.

During the spring months in an average year, green grass will likely grow faster than the cattle will consume it, and grass height will be at the high end of the desired range. During the late spring and early summer months, the grass will stop growing, die, and will be reduced in height by grazing. It will be the grazing lessee's responsibility to increase or decrease the number of cattle on a feasible schedule to achieve the standards for each management objective. Oversight will be provided by Resource Manager to ensure that the livestock tenant is making needed adjustments in a timely manner.

The results of the range analysis indicate that during a normal rainfall year, the UC Merced Management Unit would support about 1,900 yearlings (the rough equivalent of 600-pound replacement heifers) during a six-month grazing season (Table C). The stocking rate from the 2006 grazing season of 1,500 replacement heifers was lower than that, probably because of management adjustment in response to unfavorable rainfall levels.

To allow for flexibility for future management actions, the range analysis worksheets (Table C) also calculate stocking rates for other kinds and classes of animals. These calculated stocking rates are preliminary and will be adjusted based on actual use records and grazing utilization monitoring results.

It should also be noted that these recommendations for stocking rates should not be interpreted rigidly as they are rough guidelines subject to high variability resulting site and weather differences and changes in acreage. Continuing the viability of livestock operations requires flexibility in interpreting stocking rate guidelines. For example, stocking rates may exceed the carrying capacity for the first year of low rainfall following normal or high rainfall years, but such periodic heavy grazing will only have short term effects on grassland production and composition. Annual grassland and vernal pool ecosystems are adapted to such short-term events and recover quickly following relaxation of grazing pressure.

5.6 KIND OF ANIMAL

The VST Preserve easement allows general grazing use by cattle and sheep, as well as use by horses, burros, and mules to serve grazing operations and by goats only to control noxious weeds. Cattle (cow-calf, stockers, or replacement heifers) are preferred for grazing the UC Merced Management Unit for three reasons: 1) cattle prefer to graze grass rather than forbs (broadleaved plants), so they would be more effective in reducing non-native grass thatch and would have less impact on native wildflowers and special-status plants than sheep; 2) the demand for forage for cattle is greater than for sheep or goat forage, allowing more income from leases that could be available for range

improvements or ecological restoration; and 3) cattle have historically dominated range livestock operations in the area for a century or more and the vernal pool-grassland system has apparently adapted to that disturbance regime. Although likely to require a subsidy, goat grazing should be employed where useful and cost effective for small scale site-specific weed control treatments by confining goats to infested areas using temporary fencing and water trailers.

5.7 SEASON OF USE

Livestock should be introduced to the Management Unit in the late fall or early winter (October-December) after enough green vegetation (3 to 4 inches in height) has become established to provide soil protection and adequate forage. Livestock may also be turned out prior to the green grass season if enough RDM has been reserved to provide adequate forage and soil cover. The schedule for moving livestock onto the property will be determined based on visual estimates of grass height and forage biomass or RDM levels and will vary based on rainfall and temperature conditions.

Livestock will be removed in the late spring or early summer (April-June) also based on visual analysis and monitoring results to maximize resource management benefits (i.e., minimizing impacts on native vernal pool flora as well as controlling non-native invasive species) and to achieve an even distribution of grazing use levels as described above. Livestock should be removed later during favorable or late rainfall years and earlier during unfavorable or early rainfall years.

Monitoring should be conducted to determine if cattle are significantly damaging Orcutt grass or Colusa grass occurrences (Figure B-4). If so, cattle may need to be removed from those pastures before the pools dry. If early removal of cattle from these pastures is an excessive constraint on livestock operations and threatens economic viability, the portions of pools supporting Orcutt grass and Colusa grass should be excluded from late season grazing with temporary electric fencing or separated into smaller separate special management pastures with permanent barbed wire fencing. This measure should be considered carefully in context with the broader grazing program benefits because exclusion from these pools could restrict livestock access to late season water sources.

5.8 GRASS HEIGHT AND RESIDUAL DRY MATTER OBJECTIVES

To maintain optimum habitat conditions, grass height should generally be in the range of 2 to 12 inches on the basis of means (i.e., averages) for each Management Unit at any time of the year. The mean RDM at the end of the grazing season will be no less than about 800 pounds/acre depending on topographic position and slope steepness. A maximum grass height of 18 inches may be acceptable for short periods during the growing season if necessary because of feasibility limits on the livestock operation or higher than normal spring grass growth. Periodic adjustments in stocking rates should be used to balance grazing utilization with grass growth. When grass height begins to exceed these standards, additional cattle (ideally yearling stocker steers) may be introduced to the Management Unit.

The 3-inch minimum height and minimum of 800 pounds/acre correlates with moderate grazing pressure, which is required to achieve optimum forage production and good rangeland condition in California annual grassland and vernal pool ecosystems (Bartolome et al. 2002). Grazing variability at a moderate rate usually results in an uneven appearance with a mosaic of patches of longer and

shorter grass (Clawson et al. 1982). This is a desirable outcome for habitat objectives and will assure a moderate degree of landscape diversity or "patchiness" across the property. The desired minimum RDM level in this plan is consistent with the utilization level (800 lbs per acre) recommended in the previous Resource Mitigation Plan (Jones & Stokes 2002) and with results of scientific literature reviews (Bartolome et al. 2002, Edinger-Marshall and Macon 2003). Regardless, it is important to stress that these RDM objectives should be interpreted with flexibility because they are subject to variability due to site differences and weather fluctuations. As discussed previously, they may be exceeded in the short term during a dry year with no permanent damage to the ecosystem. What is important is that heavy grazing does not continue over a long period of time.

5.9 SUPPLEMENTAL FEEDING

Supplemental feeding of livestock with minerals, salt licks, and molasses/protein mixtures can be a useful tool to improve grazing distribution with locations moved periodically and placed away from water sources. Grazing use pattern maps (see monitoring discussion) will be used to determine optimal supplement locations. Supplementation with hay may be necessary during periods of low forage production. If so, certified weed-free hay should be used in accordance with Guideline IMP-2 of the MPCL (Airola 2008) and supplement locations monitored to detect and control any introductions of invasive non-native plants.

Seeding to provide supplemental forage for range improvement will not be allowed unless it is conducted as part of an approved action intended to enhance conditions for species of conservation concern (i.e., seeding after control of invasive plant species to discourage reestablishment).

5.10 INVASIVE NON-NATIVE PLANT CONTROL

Livestock grazing management is a key tool both to prevent the introduction and increase in invasive non-native weeds, and to treat infestations. Invasive plants are defined as those that are not native but can spread into wildland ecosystems and displace native species, hybridize with native plants and alter biological communities and ecosystem processes (Cal-IPC 2006, Airola 2008). For the purposes of the GMP they correspond with those species listed in Table 1 of the California Invasive Plant Inventory (Cal-IPC 2006).

Introductions of invasive plants will be minimized by avoiding to the extent possible the creation of bare ground from grading or disking or from over-grazing (i.e., forage consumption to levels below the RDM standard) and cattle concentration around water sources and supplemental feed stations. The prescription for stocking rates discussed above are designed to prevent over-grazing with the potential exception of the first year of unexpected drought. Cattle concentration areas for supplemental feeding will be placed away from water sources to the extent possible. Corrals for holding of cattle will be temporary and portable, and be situated when needed in areas designated for repeated use.

The Resource Manager will monitor areas of cattle concentration or other soil disturbances for introductions or expansion of pest plants on UC managed lands, as a part of the MPCL's IPM program (Airola 2008) and eradicate them when discovered. The lessee will be responsible for assisting the manager in identifying occurrences of pest plant species and in using grazing to control of new introductions and expansion of existing occurrences of invasive non-native plants, consistent

with the requirements and guidelines of the Integrated Pest Management (IPM) program of the UC Merced MPCL (Airola 2008). An inventory to locate and map infestations of invasive non-native weeds will be conducted annually and occurrences will be plotted using GPS technology. The invasive plant polygons will then be analyzed by the Resource Manager and grazing lessee to target and prioritize infestations for control. Weed control targets and priorities for the upcoming year will be documented in the Yearly Grazing Plan.

Grazing treatments to control invasive weeds will be applied, where appropriate, in an integrated fashion with other methods identified in the IPM guidance of the MPCL (Airola 2008). These other treatments may include mowing, herbicide use, burning, and biological controls. The Resource Manager may allow lessees to perform other forms of control if they are interested and qualified to do so.

Herbicide use will be conducted only with approved chemicals applied according to label requirements under direction of personnel with a Qualified Applicator's license. Herbicide use will follow U.S. Environmental Protection Agency (USEPA) guidelines, state and federal laws, and product labeling instructions. Any herbicides to be used near drainages, ponds, or wetlands will be labeled by the USEPA for use in or near aquatic environments. Herbicide application methods will be limited to the most target specific approaches practicable such as use of a wick applicator or spot spraying with a backpack sprayer. If these measures are followed, herbicide use will not require separate agency review and approval.

5.11 PEST ANIMAL CONTROL

Rodent burrows (created by California ground squirrels and pocket gophers) are important to several animals of conservation interest, including the California tiger salamander and (potentially) the burrowing owl. Rodent control will not be permitted within the grazing unit, except if necessary along the edges where ground squirrels and pocket gophers could conflict with adjacent land uses (See Guideline IPM-15 in the MPCL). The extent of the control will be determined by the Resource Manager in consultation with permitting agencies.

5.12 VANDALISM PREVENTION AND TRASH REMOVAL

Vandalism of range improvements such as cutting of fences has been reported as a frequent occurrence on the adjacent CST property, especially along La Paloma Road (L. Bartlett pers. com.). UC and the current UC lessee have less history on which to assess vandalism threats. The land manager will coordinate with County and campus law enforcement agencies to conduct regular patrols to discourage access and prevent vandalism (see Guidelines FPM-6, UUM-2, and UUM-3 in the MPCL). Currently the County closes the eastern portion of La Paloma Road during the fire season, generally after the grazing of the UCM Conservation Lands is completed. If problems are evident that affect UCM lands or adjacent CST lands, further coordination with the County may be warranted to discourage access, such as by closing off La Paloma Road at Snelling Road. The grazing parcels will also be periodically inspected by the land manager and grazing lessee to repair damaged facilities and remove trash or debris to facilitate livestock operations and repair resource damage (see Guideline UUM-4 in the MPCL).

6.0 MONITORING PLAN

Long-term monitoring is required to assess the effectiveness of management actions and to provide feedback information for adaptive grazing management. The primary management assumption is that the removal of annual grass thatch and control of invasive weeds through managed grazing will maintain the populations of native biological resources on the site within a natural range of variability. Should monitoring reveal that the goals and objectives of the GMP, and the MPCL as a whole, are not being achieved, current management activities will be adapted as warranted. Potential modifications include, but are not limited to:

- Changes in stocking rates, kind of animal, class of animal (as defined in Appendix B-1)
- Modification of grazing seasons
- Improved management of use through additional water sources, fencing or other range improvements
- Increased weed abatement activities

Monitoring will be focused on key management areas in each pasture that represent overall conditions, and will include photopoint documentation (Appendix B-1) in addition to actual measurements described below. Key management areas should be stratified by ecological site. All monitoring locations will be mapped using GPS systems and all data will be recorded and maintained in ARCView GIS format. Monitoring of the phenology of Orcutt grass and Colusa grass (Figure B-4) will be conducted periodically after the pools are inundated and until they begin to dry (January-May) to determine if and when cattle will be removed to protect those species.

6.1 UTILIZATION ASSESSMENTS

The monitoring program will be based on visual assessments calibrated with clipping and weighing of air-dried vegetation during the grazing season to ensure that desired grazing levels are attained but not exceeded. Monitoring visits will be made at least twice per grazing season: once in the fall or winter to determine if sufficient forage growth has occurred or enough RDM reserved from the previous year to support recommended levels of livestock grazing; and once in the summer towards the end of the grazing season to measure RDM and map grazing utilization patterns. Assessments of grass height and RDM standards will be based on an average of multiple monitoring samples (visual estimates calibrated with clipping as described below) distributed across the property in key management areas. Monitoring should be conducted so that it is inside designated key management areas that are stratified within each ecological site and do not cross site boundaries. Estimates can be facilitated using an RDM Monitoring Photo-Guide developed by Wildland Resource Solutions (Guenther 1998).

The visual estimates of RDM levels may be confirmed and calibrated by clipping plots in key locations in each grazing unit (Bartolome et al. 2002). This is conducted by placing a 0.96 square foot quadrat on the ground, removing all summer annuals (star-thistle, turkey mullein, etc.) from the

quadrat, clipping the remaining plant material as close to the ground as possible without disturbing the soil surface, and weighing the dry plant material (1 gram per 0.96 square foot = 100 pounds per acre).

The RDM levels at each plot location will be documented each year by photographs from permanent photo stations. Representative photographs of the RDM levels in each community type will be taken annually.

Grazing use patterns will also be mapped at the end of the grazing season prior to the first rains in the categories of light, moderate, and heavy use on standard aerial photographic base maps of the property. This mapping, based on visual RDM estimates, will be used to document grazing influence and use. Residual cover maps provide a useful tool for assessing livestock distribution, use, and the potential need for additional improvements (cross fencing, water sources, mineral supplements, etc.) to improve livestock distribution. In addition to mapping use levels, the average RDM will be calculated for each pasture and compared with the 800 lbs per acre minimum RDM standard.

6.2 INVASIVE NON-NATIVE PLANT MONITORING

As described under the IPM program in the MPCL (Guideline IPM-7), monitoring will be conducted annually for invasive non-native plant. This monitoring will be closely coordinated with the monitoring of grazing intensity. Monitoring prescriptions and schedules will vary by species depending on their distributions and phenologies. The goal of monitoring invasive plants is to determine if any new invasive plants are introduced to the Management Units, or if any existing occurrences are expanding.

The Management Units should be surveyed yearly by the Resource Manager and staff to locate any new infestations. All lands will be monitored, but areas emphasized will include disturbed areas (firebreaks, livestock concentration areas) and lands adjacent to potential introductions from adjacent lands (especially the campus, canals, and Yosemite Lake Park area). To monitor spread of existing infestations, the polygons of invasive weed populations will be mapped and, if necessary, individual plants counted within a polygon. The exact methods for invasive plant monitoring methods will be determined by the Resource Manager in a specific monitoring protocol to be developed based on the results of an initial inventory.

6.3 REPORTING

The Resource Manager will submit grazing program monitoring reports to the appropriate permitting agencies by December 15 of each monitoring year to describe management activities and results of monitoring. The reports will include the following information:

- a summary of grazing actions during the preceding year;
- a summary of all other management actions undertaken during the preceding year;
- a description of the methodology used to conduct the monitoring, including any changes to the methodology from that described herein;
- the results of the annual monitoring studies;

- copies of all data sheets and monitoring photographs;
- a list of all persons who participated in the monitoring and preparation of the annual report;
- a list of persons receiving the report; and
- recommendations for remedial actions and modifications to the GMP or monitoring plan.

7.0 PREPARERS

LSA ASSOCIATES

Project Manager: Richard Nichols, Certified Rangeland Manager #45

Principal-in-Charge: Roger Harris, Certified Wildlife Biologist

Geographic Information Systems: Greg Gallaugher, Senior GIS Specialist/Botanist

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Table B-1: Range Analysis for UC Merced Management Unit

Target RDM (lb/acre)	800
Dry-Matter (lb) per AUM	1000

Ecological Site	Acres	Dry-weight Production (lb/acre)			Available Forage (AUM/acre)			Total Available Forage (AUM)		
		Favorable Rainfall Year	Average Rainfall Year	Unfavorable Rainfall Year	Favorable Rainfall Year	Average Rainfall Year	Unfavorable Rainfall Year	Favorable Rainfall Year	Average Rainfall Year	Unfavorable Rainfall Year
Anderson Gravelly Soils	7.2	2750	2000	950	1.95	1.20	0.15	14.1	8.7	1.1
Clayey	982.7	3,150	2,500	1,500	2.35	1.70	0.70	2,309.3	1,670.6	687.9
Claypan Terrace	5,102.6	2,500	2,000	1,250	1.70	1.20	0.45	8,674.4	6,123.1	2,296.2
Shallow Rocky Loam	330.7	2,750	2,000	950	1.95	1.20	0.15	644.9	396.8	49.6
Upland Swale	190.1	3,500	2,650	1,450	2.70	1.85	0.65	513.1	351.6	123.5
Riverwash, Escarpments, Eroded	17.9	0	0	0	0.00	0.00	0.00	0.0	0.0	0.0
Water	42.7	0	0	0	0.00	0.00	0.00	0.0	0.0	0.0
Total	**6,673.9**							**12,155.9**	**8,550.8**	**3,158.3**

Carrying Capacity by Duration and Animal Type - Average year

Months	2	4	6	8	10	12	AUE
Cow/calves	4,275	2,138	1,425	1,069	855	713	1.00
Yearlings	5,701	2,850	1,900	1,425	1,140	950	0.75
Sheep	21,377	10,689	7,126	5,344	4,275	3,563	0.20

See Appendix B-1 for definitions of terms and abbreviations.

See Section 1.2 for methodology.

APPENDIX B-1

DEFINITIONS FOR THE UC MERCED CONSERVATION GRAZING MANAGEMENT PLAN

APPENDIX B-1

DEFINITIONS FOR THE UC MERCED TIER 1 GRAZING MANAGEMENT PLAN

TERM	DEFINITION
Air-dry weight	The weight of a substance (usually forage) after it has been allowed to dry to equilibrium with the atmosphere.
Animal-unit (AU)/ Animal Unit Equivalent (AUE)	Defines forage consumption on the basis of one standard mature 1,000-pound cow, either dry or with calf up to 6 months old; all other classes and kinds of animals can be related to this standard as animal unit equivalents (AUE), e.g., a bull equals 1.25 AU, a yearling steer or heifer equals 0.75 AU.
Animal-unit-month (AUM)	The amount (1,000 pounds) of air-dry forage calculated to meet one animal unit's requirement for one month with allowances for wastage and trampling.
Carrying capacity	The average number of livestock and wildlife that may be sustained on a management unit compatibly with management objectives. It is a function of site characteristics, and management goals and intensity.
Class of animal	Description of age and sex group for a particular kind of animal, e.g., cow, calf, yearling heifer, ewe, fawn.
Cover	(1) The plant or plant parts, living or dead, on the ground surface. (2) The proportional area of ground covered by plants on a stated area.
Ecological site	Land with a specific potential natural community and specific physical site characteristics, differing from other kinds of land in its ability to produce vegetation and to respond to management. Synonymous with range site.
Forage	Browse and herbage that are available for food for grazing animals or to be harvested for feeding.
Forage production	The weight of forage that is produced within a designated period of time on a given area (e.g., pounds per acre).
Forb	A non-woody, broad-leafed plant.
Grass	A plant with long, narrow leaves having parallel veins and nondescript flowers. Stems are hollow or pithy in cross-section.

TERM	DEFINITION
Grazing distribution	Dispersion of livestock grazing within a management unit.
Grazing management	The control of grazing and browsing animals to accomplish a desired result.
Grazing pressure	An animal-to-forage relationship measured in terms of animal units per unit weight of forage at any instant.
Key area	A relatively small potion of a management unit selected because of its location, use, or grazing value as a monitoring point for grazing use. It is assumed key areas will reflect the overall acceptability of current grazing management over the whole unit.
Kind of animal	An animal species or species group such as sheep, cattle, goats, deer, horses, elk, antelope.
Monitoring	The orderly collection, analysis, and interpretation of resource data over time to evaluate progress toward meeting management objectives.
Native species	A species that is a part of the original fauna or flora of a given area.
Overgrazing	Continued heavy grazing that exceeds the recovery capacity of individual plants in the community and creates a deteriorated range.
Overstocking	Placing a number of animals on a given area that exceeds the forage supply during the time they are present.
Overuse	Using an excessive amount of the current year's growth.
Palatability	The relish with which a particular species or plant part is consumed by an animal.
Pasture	A grazing area enclosed and separated from other areas by fencing or other barriers.
Photopoint	A point from which photos are periodically taken to monitor long-term management responses.
Plant community	An assemblage of plants occurring together at any point in time, denoting no particular ecological status.
Range (Rangeland)	Any land supporting grazable or browsable vegetation and managed as a natural ecosystem; can include grasslands, forestlands, shrublands, and pasture. "Range" is not a land use.
Range improvement	Any practice designed to improve range condition or allow more efficient

TERM	DEFINITION
	use.
Range management	A distinct discipline founded on ecological principles with the objective of sustainable use of rangelands and related resources for various purposes.
Residual dry matter (RDM)	Residual dry matter is the old plant material left standing or on the ground at the beginning of a new growing season (typically early fall immediately prior to the first rains).
Rest	Leaving an area ungrazed for a specified time.
Stocking rate	The number of specific kinds and classes of animals grazing a unit of land for a specified time period.
Use	The proportion of current years forage production that is consumed or destroyed by grazing animals.
Weed	(1) A plant growing where unwanted. (2) A plant having a negative value within a given management system.

Reference:
Ortmann, J., L.R. Roath and E.T. Bartlett. 2000. Glossary of range management terms no. 6.105. Colorado State University Cooperative Extension. 5pp.

Appendix D

Management Plan Compliance Checklist

		Management Activity		
Management Program	Guideline Number	Description	Frequency or Completion Date	Annual Compliance Reporting (Completion Status, Results, Issues)
Grazing				
	G-1	Lessee selection and management	At time of new lessee selection	
	G-2	Livestock type	Ongoing basis, report annually	
	G-3	Stocking rates	Ongoing basis, report annually	
	G-4	Season of use	Ongoing basis report annually	
	G-5	Protection for deep pool grasses	Ongoing basis, report annually	
	G-6	Residual dry matter grazing standards	Ongoing basis, report annually	
	G-7	Supplemental feeding	Ongoing, basis report annually	
Fire Protection and Management	FPM-1	Fuelbreak construction	Spring 2008 and as required subsequently	
	FPM -2	Resource protection during fuelbreak construction	Spring 2008 and as required subsequently	
	FPM-3	Conduct annual firebreak maintenance	Annually	
	FPM-4	Monitor firebreaks for noxious weeds and treat as needed	Annually	
	FPM-5	Protection from adjacent land use changes	As required	
	FPM-6	Routine daily law enforcement patrol	Daily, report annually	
	FPM-7	Staff training in fire protection	Spring 2008, and upon hire of each new employee	
	FPM-8	Fire prevention training for contractors	As required	
	FPM-9	Fire prevention planning for future construction	As required	
	FPM-10	Contract fire protection services	Annually	
	FPM-11	Incorporate resource protection into fire protection contracts	Biannually	
	FPM-12	Ensure compliance with resource protection requirements during fire suppression actions; provide resource information to suppression agency	Annually	

Management Program	Guideline Number	Management Activity: Description	Management Activity: Frequency or Completion Date	Annual Compliance Reporting (Completion Status, Results, Issues)
	FPM-13	Conduct fire rehabilitation planning	Initiated within 2 weeks after wildfire	
	FPM-14	Prescribed fire use to control noxious weeds	As needed	
	FPM-15	Conduct interdisciplinary analysis and meet CDF requirements for prescribed fire for weed control	As needed	
Unauthorized Uses Management	UUM-1	Develop and deliver continuous public education program	Ongoing basis, report annually	
	UUM-2	Routine security patrol (incl non-fire season)	Daily/weekly	
	UUM-3	Incorporate reporting of unauthorized use into leases and use agreements	On new lease issuance	
	UUM-4	Evaluate effects of unauthorized uses	Following incidents	
Integrated Pest Management	IPM-1	Maintain Pest Species list	Ongoing basis	
	IPM-2	Monitor to verify use of weed free hay	Ongoing basis, report annually	
	IPM-3	Require cleaning of vehicles and footware and operate and monitor a vehicle washing station	Ongoing basis, report annually	
	IPM-4	Prohibit introduction of non-native species	Ongoing basis, report annually	
	IPM-5	Require and verify use of weed free erosion control materials in adjacent construction areas	Ongoing basis, report annually	
	IPM-6	Prohibit invasive species in landscaping	Ongoing basis, report annually	
	IPM-7	Monitoring for weed invasions	Formal survey annually, informal monitoring continuously	
	IPM-8	Develop weed treatment prescriptions	As required	
	IPM-9	Control noxious weeds	As required	
	IPM-10	Coordinate mosquito control to minimize effects	As required	
	IPM-11	Control of aquatic vertebrate pests	As required	
	IPM-12	Coordinate on pet control	Ongoing basis, report annually	
	IPM-13	Direct control of pest vertebrates	Ongoing basis, report annually	

Management Program	Guideline Number	Management Activity: Description	Management Activity: Frequency or Completion Date	Annual Compliance Reporting (Completion Status, Results, Issues)
	IPM-14	Control of nonnative rodents	Ongoing basis, report annually	
	IPM-15	Control of native rodents	As required	
Research and Educational Uses	REU-1	Research uses approval and reporting	Annually	
	REU-2	Locations of research activities	Annually	
	REU-3	Research on Future Campus Lands	Annually	
	REU-4	Research proposal evaluation and approval	Annually	
	REU-5	Research Results	Annually, as available	
	REU-6	Educational uses – TNC lands	None required	
	REU-7	Educational uses – UC lands	Annually	
	REU-8	Educational uses – UC lands	Annually	
	REU-9	Approval process	Annually	
	REU-10	Supervision of Educational uses by non-UC groups	Annually	
Habitat Enhancement	HPE-1	Treatment of ground disturbance	As required	
	HPE-2	Restore unauthorized disturbance	As required	
	HPE-3	Install kit fox burrows	Within 1 year	
	HPE-4	Other habitat structural improvements	As desired	
	HPE-5	Complete kit fox canal crossings	Within 3 years ???	
Recreation and Other Public Uses	R-1	Limit recreation uses on Tier 1 lands	Incorporate into R-3 use application	
	R-2	Prohibited uses	Incorporate into R-3 use application	
	R-3	Use applications	Ongoing basis, report annually	
	R-4	Recreation use applications and approvals	Ongoing basis, report annually	
	R-5	Recreation plan element revision	Year 5–10	
	R-6	Restricted use of Tier 1 lands	Incorporate into R-3 use application	

Management Program	Guideline Number	Management Activity: Description	Management Activity: Frequency or Completion Date	Annual Compliance Reporting (Completion Status, Results, Issues)
	R-7	Recreation use on Future Campus lands	Ongoing basis, report annually	
Cultural Resources	CR-1	Protection from vandalism	Ongoing basis, report annually	
	CR-2	Maintain cultural resources inventory	Ongoing basis, report annually	
	CR-3	Records search prior to disturbance	As required	
	CR-4	Conduct ground surveys prior to disturbance	As required	
	CR-5	Protect cultural resources during ongoing activities	Ongoing basis, report annually	
	CR-6	Mitigation for cultural resource disturbance	As required	
	CR-7	Develop procedures for accidental discoveries	Within 1 year	
Visual Resources	VR-1	Prepare visual resource sensitivity map	Within 1 year	
	VR-2	Visual resource protection during management actions	Ongoing basis	
Interjurisdictional Coordination	IC-1	Share resource information	Ongoing basis, report annually	
	IC-2	Maintain contacts with adjacent landowners and jurisdictions	Ongoing basis, report annually	
	IC-3	Monitor and provide input to land use decisions	Ongoing basis, report annually	
	IC-4	Submit compliance reports	Annually	

Appendix E

List of Acronyms

List of Acronyms

AUMs – animal-unit-months
BA – Biological Assessment
BO – Biological Opinion
Cal Fire – California Department of Forestry and Fire Protection
CLR – Campus Land Reserve
CNR – Campus Natural Reserve
CRHR – California Register of Historic Resources
CRT – California Rangeland Trust
CST – Cyril Smith Trust
CWA – Clean Water Act
DFG – Department of Fish and Game
EIR – Environmental Impact Report
EIS – Environmental Impact Statement
EPA – Environmental Protection Agency
ESA – Endangered Species Act
IPM – Integrated Pest Management
LRDP – Long Range Development Plan
NRS – Natural Reserve System
PLAN – Management Plan
RDM – Residual Dry Matter
RMP – Resource Management Plan (see Jones & Stokes 2002)
SNRI – Sierra Nevada Research Institute
TNC – The Nature Conservancy
UC Merced – University of California Merced
USACE – U. S. Army Corps of Engineers
USFWS – U. S. Fish and Wildlife Service
VST – Virginia Smith Trust
WCB – Wildlife Conservation Board

Appendix F

Conservation Easements for Tier 2 Conservation Lands

As of September 2008, Appendix F is incomplete. It will be finalized following completion of remaining conservation easements for Conservation Lands properties.